From Prof. M. W. Harringt

SEVENTH ANNUAL REPORT

OF THE

BOARD OF HEALTH

OF THE

STATE OF NEW JERSEY.

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THE STATE BOARD OF HEALTH.

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REPORT OF THE SECRETARY OF THE BOARD.

To His Excellency George C. Ludlow,

GOVERNOR—The State Board of Health of New Jersey begs leave to present to your Excellency its seventh report. The duty assigned to us in the constituting act was "to take cognizance of the interests of health and life among the citizens of this State; to make sanitary investigations and inquiries in respect to the people; the causes of disease, and especially of epidemics; the sources of mortality, and the effects of localities, employments, conditions and circumstances on the public health, and to gather such information in respect to these matters as it might deem proper for diffusion among the people." Since that time various other laws have been placed upon the statutes of the State, which have assigned to us other important duties. In the fulfilment of these obligations we find ourselves charged with responsibilities that relate to high social and industrial interests of the citizens, and that most directly concern the welfare of our whole population.

While there is a general consent to the fact that health is a great blessing, and that the preservation of life is, as a rule, the essential duty of a good government, there is not an adequate appreciation of the value of wellness as a source of strength and prosperity to a State. Industry, capital and security depend upon it as a resource. To foster it is to foster the dearest interests of a people. As science, observation and statistics are constantly showing how many deaths are avoidable and how many diseases are preventible, there is no direction in which intelligent judgment and reasonable expenditure yields better results. It cannot be concealed that premature death and burdens of sickness are constantly resulting from insanitary conditions which never should have occurred. The common consent that nuisances injurious to health must be abated, is an argument that such as could have been avoided should never had occurred. The liberal outlay made to stop an

epidemic after it has attained headway, suggests that a truer economy would have been to avoid its causes or deal with it in the first household. With regard to our own country and our own State, it is not unsafe to re-affirm that the same is true as was some time since asserted by Mr. Simon in reference to England:

"It is the common conviction of those who have most studied the subject, that the deaths which occur are by fully a third part more numerous than they would be if *existing* knowledge of the chief causes of disease were reasonably well applied throughout the country. This annual excess has the terrible further meaning that, as a rule, each death represents a number of other cases in which preventible disease, not fatal, has had far-reaching ill effects on the continued life, or added the many embarrassments which occur from more fatal attacks of sickness.

"Death accounts also, whose figures, arithmetically, make but little show, may, for administrative purposes, have immense meaning. One or two deaths in some village may, in hundreds of instances, correspond to long-continued local conditions of scandalous filth and unwholesomeness; one or two deaths by scarlatina or small-pox, almost unnoted in regard of some considerable town, may represent the beginning of what, three months later, will be a terrible epidemic, agitating the community with distress and fear, and adding prodigiously to the whole year's death rate of the place. In proportion as a disease is present the time of preventing it is past; but, for practical purposes, it is indeed all-important to remember that sanitary administration has its hope of success in preventing, not in arresting, great epidemics; and that if warnings are not taken from the smaller excesses of disease, *catastrophes*, not further warnings, may be next to come. It seems almost unnecessary to add, that a method of procedure which waits for death as its ground of action, may peculiarly dispense with cumulative proofs; and that, as no one preventible death can be remedied in regard of him who has suffered it, so the record of it may the more emphatically claim to be read as a protest on behalf of others."

No one can make even a cursory or superficial study of the contrasts between the death rates and sickness rates of city and country, or parts even of the same city, without learning that these are often but the forcible declaration that either the persons or the places are not conforming to the known laws of healthful existence. Sanitary art, made up as it is of medical and mechanical knowledge, and having ascertained how it is possible to make ground and houses best adapted for human dwelling-places, and how men, women and children should live so as to be true to the demands of sound humanity, no longer

admits that it does not know how to improve the social conditions of a people. The last annual report of the Registrar-General of England (44th, Abstracts of 1881) says: "There is nothing in the series of annual reports issued by this office that comes out more distinctly and unmistakably than the wonderful effects which the sanitary operations of the last decade have had in saving life. The death rate for this year, in England, was 18.9 per 1,000 living. The death rate in the urban population, consisting of some fifteen and a half million persons, was 20.3; while that of the rural population, comprising some ten and a half million of persons, was 16.8. Comparing the years for 1862–71 with those of 1872–81, the deaths in the latter were so much less in proportion that 392,749 persons who, under the old regime, would have died, were, as a matter of fact, still living at the close of 1881. Add to these saved lives the avoidance of at least four times as many attacks of non-fatal illness, and we have the total profits as yet received from sanitary expenditure." These facts are valuable to us for comparison, since they extend over twenty years, and are furnished by skilled observers, and accepted by the best authorities. They relate to a nation in which the teeming population, and the great obstacles constantly presenting, make such an attainment the best assurance of greater possibilities. "There can be no real doubt," says the report, "that the saving effected in life was the direct product of the money and labor expended in sanitary improvement."

The deaths for the State of New Jersey, for the year reaching from July 1st, 1882, to July 1st, 1883, were 23,310; which is a considerable decrease from the previous year, while the marriages and the births have increased. Fuller particulars will be found in the report of the Medical Superintendent of Vital Statistics. A review of the past year, and of the period to which these vital returns relate, together with abundant other testimony afforded to this Board, assure us that both the public and the local health authorities are realizing the great significance of health and care, and the value of those improvements which secure good water, proper disposal for decomposable substances, good houses, cleanly habits, and chances for employment deprived of all avoidable insanitary conditions. Several cities and townships have entirely modified their health administration, and others are so agitating the need as to be sure, eventually, to bring about desired results. The summary of reports from local Boards is well worthy of study as a guide. The relation of the State Board to local Boards has proved of signal advantage to both. Information and guidances are secured,

and that unity and coöperation which gives a system of health administration more and more tending toward efficiency and completeness.

LEGISLATION AND PUBLIC HEALTH.

Sanitary art is so new in its practical application to the wants of communities that it cannot be expected that the courts should abound in precedents, which, in law, so much guide decisions. It is an encouraging starting-point that common law is very considerate of the rights of the individual to be protected from nuisances. It does not always claim that these must be shown to be injurious to public health; but even if they cause decided, frequent discomfort to the public in general, or to ordinary persons of the immediate vicinage, the law calls for their abatement. If the nuisance is not one attended with smoke or odors, but is one which is shown to cause sickness, it is easily abated under the law of nuisances. So long as there are differences of opinion among medical men or sanitarians as to the relations of certain causes to disease, so long will courts and juries have to gather facts and opinions, and be governed by the weight of testimony. As there is often defect in testimony, or in evidence, it cannot be expected that every case will be decided according to the views of Boards of Health. So pronounced, however, is the common law in its declarations as to nuisances, and so evident is its possibilities of relief, as in the mill-dam case at Bound Brook, that the mode of indictment, grand jury complaint and jury trial is never to be lost sight of in that class of cases in which there is no occasion for haste. As, however, there are many cases where delay is dangerous, and as the assumption of danger to health, if real, is always a peril to somebody and to life itself, law is wise in providing methods of more speedy relief. One of these methods, which has been found very useful, is that by Court of Chancery. So far as we know, the claims to summary proceeding in cases where the public health is concerned have been fully recognized by this court.

In a case in Elizabeth, where a factory, in dealing with irritating acids and the sludge from petroleum refineries, was strongly complained of, Chancery granted an expert commission, with power to control, to experiment and to report, as to whether it would be possible to conduct the business and yet secure comfort to the residents of the vicinity. As the general law which gives this power does not reach

all cases, the Legislature, in 1883, passed a law, of which the following are sections (Sections 10, 11, 12, Ch. CV.):

"10. *And be it enacted,* That any such Board of Health, instead of proceeding in a summary way to abate a nuisance or such source of foulness, may file a bill in the Court of Chancery, in the name of the State, on the relation of such Board of Health, for an injunction to prohibit the continuance of such nuisance or source of foulness, and such action shall proceed in the Court of Chancery according to the rules and practice in such cases on the relation of individuals, and cases of emergency shall have precedence of other litigation pending at the time in the Court of Chancery, and may be heard upon final hearing on such notice as the chancellor shall direct.

"11. *And be it enacted,* That in all cases in which it shall be ascertained by the Court of Chancery in such suits that a nuisance or source of foulness existed at the time of finding such bill, substantially as set forth in the same, the court shall have power to abate the same, by injunction or otherwise, according to the practice of the court, and may charge the costs of such suit upon the property whereon such nuisance or source of foulness is found, and enforce the same by sale of the said property on writ of *fieri facias,* or so much thereof as shall be necessary for that purpose, or the said court may order the person or corporation which caused said nuisance or source of foulness, or allowed the same to continue, to pay such costs, and enforce obedience to such order.

"12. *And be it enacted,* That in case no nuisance or other source of foulness, hazardous to the public health shall be found to exist, costs shall not be awarded as of course against the Board of Health which caused such suit to be brought, but only in case it shall appear to the chancellor that no probable cause existed for bringing such suit."

Under this law, a case from the Board of Health of Washington borough, in Warren county, and another from Bridgewater township, in Somerset county, and another from the city of Trenton, have been before the Court of Chancery. These related to cesspools and the pollution of streams, and showed the value of this method of procedure.

The third course of procedure recognized in our law is that which is intended to authorize Boards of Health to view and pronounce upon nuisances. The first sections relating thereto are to be found in Ch. CLV. of the laws of 1880, being Sections 7 and 8 of the law. This law intends to recognize sanitary administration as at times or in some of its methods being of the character of a police power, viewing the Board or its inspector as dealing with a sanitary police measure justifying and requiring summary proceeding. Such a principle has been fully recognized in English courts and in some of our own States.

References can be found in articles in our third and fifth reports, by E. S. Atwater, counselor-at-law, and also in an article by him in the New Jersey Law Journal, May, 1883, entitled "The Police Power and Boards of Health." Two points have seemed to be disputed in this State in decisions made before the mode of procedure, as now designated in legislative enactments, were made. The one is that judgment cannot be pronounced in a case until the person concerned has been summoned to appear, and so have notice and opportunity to be heard. The answer now made to this is that there are cases where the immediate interests of health may not permit of this, and that the sections of the law, as at present framed, provide against oppression. The danger of invasion of the rights of all the citizens are, in such cases, greater than the danger of invasion of the rights of the individual, who is provided also with prompt methods of appeal. On this point this Board has been instructed that the action had is not of the nature of a trial, but a viewing and a pronouncing under the necessities or proprieties of the case, the time for hearing being as soon after as may be, and the Board having to rest the ground of their action on its ability to prove the fact of the nuisance and peril to public health. While it is believed such a view in a case of appeal, where this is the main question at issue, would be sustained, there are others who think it better to serve notice and call the person concerned to a hearing, and then to proceed, not as by trial, to pronounce whether or not the thing complained of needs summary abatement under this law.

Another method by which a Board may "examine the matter in a summary way," is to go before a police justice, and summon the party to appear. In a case tried in this way in an action of the Board of Health of Paterson, the defendant asked a jury, but the justice decided that under the law it was a summary proceeding which did not entitle to a jury at this stage. Such is the spirit and intent of a law intended for a sanitary police measure. The claim for such procedure in peril to public health is as defensible as in numberless cases that come before a police justice, or a justice of the peace acting as such. It was hoped that this case would go up by appeal, but it has not. On appeal it is fully recognized by Boards of Health that their defense must be the fact of nuisance, and that their modes of inspection and of abatement of nuisance have been such as the law and the necessities of the case justify, and that the costs have not been exorbitant.

It is clear that where inspection is forbidden or resisted, or where

attempted removal by the Board of the nuisance is forbidden or resisted, there must be resort to a warrant or other proper method of going upon private premises. Two efficient city Boards have been unable to sustain their cases because of irregularity in these respects. This only shows that full legal advice is required in such cases, and that the forms of law must be observed. As public opinion is generally with Boards in the abatement of nuisances, the great objects of a Board are generally accomplished without that factious opposition which is sure, occasionally, to be met. Yet even this is found, as a rule, to lead to such inquiry as to aid a Board in its work. The powers now conferred on Boards of Health, in this State, are adequate to most emergencies, and, in general, such as will be sustained by the courts, unless they are exercised in a way that cannot be defended. For the time being, the Board must judge of the fact of nuisance. This does not, and probably ought not, prevent their being called upon afterward to rest their right of abatement on their ability to show to a court or jury that the thing complained of was actually a nuisance, although some decisions in other States have recognized the judgment and decision of a Board to be that of experts, and thus final as to the fact. The State Board of Health has, in connection with most of the health laws of this State, availed itself of the opinions of excellent legal and legislative authorities, and believes that the rights of local Boards are as likely to be maintained before the courts as those of any other constituency.

The recent decision (November, 1883,) of the Supreme Court of New Jersey on the milk adulteration act, and the opinion of the court, as delivered by Justice Reed, has important bearing on other laws of the State relative to public health, and confirms these views.

WATER-SUPPLY.

The question of water-supply is so important that it very properly attracts constant attention in this State. The fact that nearly one-half the population of the State is so located, in Hudson, Essex and Union counties, as not to be able to be supplied by wells, necessitates the most careful consideration of the sources of public supply. Intermediate or adjacent rivers are so available for manufacturing and sewerage purposes, that the lines of safety must be closely and accurately drawn. A special commission was, two years since, authorized by the State, in order to determine the best permanent

sources of supply. Owing to inadequacy of appropriation, no survey was made the first year, but under special provisions of the last Legislature, the commission has been steadily at work for the present year, and will no doubt aid in determining the best sources of supply.

It is gratifying to know that in various localities, Boards of Health have directed attention to the need of special inquiry into the value of well waters, the feasibility of cisterns, and to more public sources of supply. Scarcely a town of any prominence, not already supplied, but that has considered the subject. Princeton has secured its supply from a ridge of gravel which was fully tested by competent engineers, both as to quality and capacity, before choice was made. The well is about 25 feet in diameter and 20 feet deep, and is estimated to furnish 150,000 gallons per day. The stand-pipe, 60 feet high, is placed on a trestle 60 feet high. While the question of source of water-supply must always be a relative one, there are many localities where it is best to rely upon gravel beds or nature's store-house in the ground, instead of upon streams surrounded by alluvial soils and carrying an excess of decomposable matters. Skilled aid is always to be sought in making the choice. We know of an instance in this State where a well-intentioned Board has probably made a great error, and entailed much loss upon the city. The Atlantic City water-supply and stand-pipe mark an advance in its history. Ocean Grove has completed its driven well, which goes to a depth of 422 feet, and gives a present supply of 50 gallons per minute. The water is chemically very pure, and at present promises to afford abundant supply. If this proves as constant as expected, no doubt other similar wells can be placed at various localities. Gloucester City has water-works of recent construction. Several other cities are examining into methods of supply or adopting needed improvements.

There is need of some care in placing the water-supply of cities in the hands of companies, since when these are once established it is found difficult to correct any defects as to the quality of supply. Generally, cities should have control of so important an interest. The cleansing of reservoirs and the examination of pipes is too often neglected. A recent cleaning of the Camden reservoir showed an unexpectedly large deposit, and resulted in great improvement of the water-supply. Where water is periodically bad, companies or the people should not accept speculative views as to causes, but avail themselves of those facilities for knowing which science and art so readily afford. We find in too many cities which have a water-supply, that

some of the people rely on wells of doubtful purity. Where this is the case, city authorities should have wells examined, and not allow their use if found to be contaminated. It is very frequently the case that wells are not properly protected at the surface of the ground. It is much the best to have the stone or brick laid in cement for at least three feet from the surface, and then have a stone or arched covering. No water should be allowed to drip back into the well, and the stone itself should be so compacted round about as that no washings of any kind can enter. As the well is the natural drain for the soil for many yards around, the adjacent soil should never receive slops or soiled liquids of any kind, or compost, more than such as can quickly be disposed of by the air and the vegetation. We recently saw a well surrounded by a thick layer of compost; the idea of the owner being either to protect it from cold or to make the ground very rich in the house yard. As a rule a sterile soil around the well is best. Recent investigations are attaching more importance to wells as related to malaria. It is now claimed more than ever before, that in malarial districts the water is often a source of malaria, when the air would not alone cause the manifestation of the disease. The need of a pure water everywhere is such that too much cannot be said in its behalf. I had occasion to examine a well this year, within twenty feet of which one person was dead of typhoid fever and another very sick; the privy was less than two feet from the well, but because it was a driven well of eighteen feet and the vault was only five, the inmates of the house had apprehended no danger. The rinsing of utensils at the well is entirely a too common practice. Water, in numberless instances, has been proven to be the conveyancer of disease, and, where suspected, should always be boiled if intended for drinking purposes.

SEWERAGE.

Questions as to sewerage have pressed themselves upon the attention of the cities and larger towns of the State as never before. No longer is any health resort able to certify to its health attractions unless it can show just how it disposes of its liquid refuse, garbage, etc. That, as a rule, it must not be stored or ponded upon the premises, under ground and out of sight, is now generally conceded. Most of the growing inland cities of the State have come to the same conclusion. The sad effects from the gases of a Passaic cesspool has recently afforded us evidence of what an accumulation of foul gases and organic matter

can do. Where, from temporary necessity, vaults are used, the imperative necessity of frequent and skilled cleansing is admitted. The cesspool, built so as to leak out its liquid unseen into the ground surrounding dwellings, is no longer defended to any large extent. Such leakage can only be justified under special and regulated conditions of soil, locality, emptying and cleansing. Where tight cesspools are used, the quantity of spoiled liquid that accumulates renders its removal quite expensive. Water-carriage, or the conveyance of the fouled liquids and macerated solids by means of sewers, is more generally advocated. Hence, many of our cities are either considering or executing plans of sewers. Atlantic City has consummated a contract to remove, by sewer pipes and water-carriage, all sewage, miles beyond the city limits. Ocean Grove discharges into the ocean by a continuous flow, carrying the sewage out in its fresh state, and to such a distance as renders, it is said, any return impossible. Asbury Park receives it in well-constructed sea-side cesspools, and then discharges at frequent intervals out into the sea. Other of our resorts depend upon the daily dry removal of all closet material. A few still cling to series of cesspools, into which, could the guests look about midsummer, or have report upon the plan, the rooms would be cleared as a matter of wise precaution. When a place essays to bring itself into prominence as a resort for health, it must not regard it as intrusive for all or any one to inquire into its modes of household disposal, and of assumed cleanliness. Happily, with only here and there an exception, our State health resorts have responded to the call, and are, we believe, in advance of those of other States; because, as a rule, they have been more closely watched. Besides, a public sentiment has been created that demands attention to these matters. The great danger now is that work will be imperfectly or hastily done. The readiness with which the average householder, and especially the average plumber, considers himself fully competent to devise and execute some scheme of sewage disposal, heating or ventilation, is only surpassed by the deliberate wisdom with which some council committees sit in judgment and express opinions on purely expert and technical questions of sewer construction and sewage removal. On questions of financial expediency, and some other incidental questions, they are the only real judges; but are rarely competent to decide as to plans of construction or disposal. There is no longer any excuse for errors as to method or for financial extravagance. The principles of dealing with household liquids and refuse are now well understood,

and the methods well devised. The chief trouble in execution is to secure competent oversight and faithful administration.

MALARIA.

During the past year malaria has been much less prevalent in the State than for the last three years. While it can not be said that the essential cause is always known, yet the occasion of its occurrence and the conditions under which it mostly prevails are understood. That it may be produced at a distance, and in certain heavy conditions of atmosphere be wafted to places which otherwise would not have it, is undoubtedly true. But the rule of its occurrence still is that heat, moisture and vegetable decay are the factors in its production. Decomposition and putrefaction of different forms of vegetable matter occur under somewhat different conditions of heat and of moisture. The heat itself varies in degree, and the humidity of the atmosphere affects both persons and places, variously, accordingly as various laws are brought into operation. But the safety from this, as from many other diseases, is in the choice of a locality free from what we know to be the concomitants of this affection, and in such care of personal health as will enable us to resist this and other miasma. Our attention has this year especially been called to local defects of drainage in and near Eatontown, in Monmouth county; Blackwoodtown, in Camden county, and Hope, in Warren county. In each the unusual occurrence of malaria, or to a greater degree than formerly, seems to be attributable to accumulations which have been going on for years, and which at last reach that maximum which in a favoring season is sure to result in malaria. It is a significant fact, that we never yet have found a physician of long experience in any such locality who has not been able to satisfy himself of the relation of local conditions. In the vicinity of Eatontown, some important clearing of the stream has already been done, and, in other cases, investigations are being made with good prospect of abatement.

We need also to draw the attention of citizens to the fact that places which are by nature free from the usual occasions of malaria, may become affected as a result of changes made by construction. We believe, for instance, that there is no strip of land in the United States more free from malaria, than the sea-shore of New Jersey and the land adjacent thereto. Yet here and there we can pick out local-

ities where there are sporadic cases. Nor is it very difficult, as a rule, to trace causes.

Some stream is entirely altered in its course or made to contribute to an artificial lake or pond in an objectionable way. These streams, which are nature's drain pipes, may sometimes, between high hills or in the upper part of their courses, be interrupted by dams or made into ponds. But very rarely is this safe to be done near their outflow. Many such amateur improvements are the devices of those who know little of sanitary engineering, and too often compliment themselves on what pleases the eye at the expense of health. We warn against all such artificial lakes and ponds, unless those really capable have shown how they can be secured without heightening the water level in the surrounding soil, or causing more or less stagnation.

It is to be remembered, too, that in all excavations of soil and building of towns changes of soil and of level are made, and that the sun is shut out so as to cause more moisture of the ground. Whenever we have to deal with a locality naturally healthy, we have great advantages, but must consider the possible effects of every change being made, and by compensatory adjustments retain the local healthfulness. Attention needs to be drawn to the frequent covering up of wet places without any attempt at under-drainage. Many a pond is thus vacated, only that its water may increase the general height of stagnant and subsoil water in the land that is soon to be cut up into lots and offered for building purposes. Salt meadow or marsh is frequently thus covered without even the cutting of lines through its tough sod. "Although a large quantity of salt prevents putrefaction, a small quantity favors it." Dr. Letheby and others have noted the amount of putrid organic vapor from such marshes. When near the sea this is quickly diffused and does not concentrate. But if the mud and grass of these salt tracts is covered over, the organic matter undergoes decomposition under circumstances most favorable for the befouling of ground, of cellars and of streets without any compensatory methods of diffusion or disposal. We can point to places suffering from malaria from this very cause. Let all marshes be drained before the in-filling.

It is not surprising that in some of our cities we are finding an undoubted increase of malarial influences. Besides that addition of animal matter which causes its own class of decay, we are to remember that in cities much vegetable matter finds its way to the soil, and that many a street becomes enriched beyond the usual fertilizing of a field.

The use of vegetables and of grasses for food involves the burying in of much organic material, and the growth of low forms of vegetation is constantly and rapidly going on in city soil. Heat and moisture are increased by the locality of buildings, and the air and often the water have to receive particles of vegetable as well as animal growth or decomposition. Under and around houses such a temperature is often sustained in winter as prevents frost and cold, so that with summer conditions it is not surprising that we have summer diseases, and that malaria shows itself in the winter. However much inquirers in localities may indulge hypotheses as to the foreign origin of malaria, and however true it may be that occasionally it is wafted down from some outlying spot, the chief fact is that local conditions of the place and some favoring condition of the person prove the occasion of the actual attack. At a recent meeting of the National Public Health Association, papers and discussions on the subject revealed greater unanimity on this point than on any other as to malaria. The belief that water becomes the vehicle of malaria was also fortified by many significant facts. One great want of this State as to the health of its people is that no town should be started, no house should be built, on ground that has not been so thoroughly drained as that the water level as a rule does not maintain itself higher than ten feet below a surface through which the ground air can permeate it. A sweet, dry soil is the beginning of an assurance that healthy beings can be kept upon its surface.

SMALL-POX.

Although small-pox has been less prevalent this year, we have had sufficient to emphasize the importance of vaccination. Situated between two large cities, with many large cities of our own, and with almost the whole State a highway for travel, our only protection from oft-recurring epidemics is in the systematic vaccination of all children that attend the public schools. The introduction of bovine lymph has removed the only possible criticism that could be made upon the operation, and the reality of the protection is each year more fully illustrated. Even where there are failures, the facts in evidence show the reasons of the failure and so substantiate the law. Our last report in a thorough manner put on record all needed particulars, and (Circulars 18 and 20, fourth report, 1880, page 301, and fifth report, 1881, page 178,) give all necessary details as to procedure in

case of an outbreak. In an outbreak that occurred this year, the refusal of a parent to have a child at home vaccinated, not only resulted in its death but in the spread of the disease. While in scarlet fever and measles we have no mode of protection such as that provided against small-pox, experience shows that by isolation of those attacked, by oiling so as to prevent the scarf skin from being blown about during convalescence, by a thorough airing, washing or burning of all articles in the house, and by an enforced cleanliness of persons and surroundings, we can prevent these diseases from growing into epidemics. The contagion, while it is persistent, and will dwell long in unaired localities or uncleansed and unaired garments, is not transmissible through the open air for long distances. Well-understood methods of management at the start would often prevent the necessity of school dismissal, which may cause a scattering of the disease or an interruption of study.

While these diseases are not believed to have a local origin, they are rendered malignant by foulness, and so every effort at ventilation, cleanliness and disinfection should be secured.

Diphtheria and typhoid fever, on the other hand, seem to originate from household vegetable decay and dampness, from impure water and from other local conditions; and so, both for prevention and for relief, require the most assiduous cleanliness. For further particulars as to these and other diseases, reference may be had to the summary of local reports and to the record of the medical superintendent of vital statistics.

CHOLERA.

During the past summer, the facts as to cholera in Egypt were such as to lead many of the European governments to the adoption of precautionary measures. Past experience has shown its tendency to advance, and the disease has not been mitigated in its severity. The rapid transatlantic transportation now, makes it very certain that the disease occurring in Germany, England or France, will be more rapidly transmitted to us. While there has been some modification of quarantine methods, there has been no alteration of views as to the necessity of at once isolating individual cases, or as to the need of the most thorough sanitary precautions as to cleanliness, in order to prevent it from attaining the proportions of an epidemic. Hudson county and some other portions of the State are especially exposed, and are not able to avail themselves of as ready or complete sanitary

provisions as are in operation in New York. In case of any threatened or actual outbreak, this Board will be prepared with all necessary instructions, but on the prevision and preparation of local authorities must chiefly rest the duty of active and timely relief. Especial attention early in the spring should be given to thorough cleansing, and sanitary police of all cities and each local Board should know just what it would do in case of a sudden outbreak. Cholera and other hospitals are now quickly improvised at small expense; models of which can be had at this office or from other sources. It is this readiness beforehand to meet possible emergencies, and which the first day does just what ought to be done, that avoids those sad consequences which a delay of a few hours sometimes secures. Our power to prevent epidemics is almost absolute, if we meet them at the threshold, or have hold of the checks and apply them in time.

DISINFECTION AND DISINFECTANTS.

While our chief reliance is upon ventilation and cleanliness, the value of thorough disinfection is fully established and sustained.

Circular VIII. (4th Report, 1880, p. 260,) gives all necessary particulars as to their use. Since the issue of that circular, commercial sulphuric acid, in the proportion of a pint to eight gallons of water, has been accredited as valuable to be sprinkled about for the destruction of low forms of vegetative life associated with diseases.

Fumigation with roll sulphur cracked fine and set on fire, so as to have its fumes enter every part of the house while unoccupied, is very valuable. Privy and cesspool vaults may well be cleansed by letting down a tin tomato can with lighted sulphur in it, and then closing the cover or seat, so as to have the gas permeate the whole vault.

One ounce of nitrate of lead dissolved in a pint of hot water, and a pint of salt dissolved in two pailsful of cold water, and the two mixed, gives a valuable chloride of lead disinfectant. Sulphate of iron (copperas or green vitriol), two pounds to a gallon of water, is also greatly to be valued as a disinfectant.

Corrosive sublimate, in the proportion of one part to 500 of water, has great value as a preservative and disinfectant. The poisonous character of some of these disinfecting solutions, if taken into the stomach, must be borne in mind.

Besides the use of other disinfectants in the sick-room, the vapor of tar or the fumes from a vessel of boiling water containing tar, placed

upon the stove, are often found serviceable. The use of whitewash, and its value as a cleanser and disinfectant, is never to be lost sight of.

The recipe for the whitewash known as the Treasury or White House whitewash is as follows:

"Slake one-half bushel of unslaked lime with boiling water, keeping it covered during the process. Strain it, and add a peck of salt dissolved in warm water; three pounds of ground rice put in boiling water and boiled to a thin paste, and one-half pound of powdered Spanish whiting, and one pound of clear glue dissolved in warm water. Mix these well together, and let the mixture stand for several days. Keep the wash thus prepared in a kettle or portable furnace, and when used put it on as hot as possible, with painter's or whitewash brushes."

The glue should be soaked in about three quarts of warm water over night, and then the Spanish whiting added to it. When there is old whitewash on the walls which is flaky or makes them uneven, it should be scraped off, and the walls have a thorough washing with a solution of sulphate of zinc (white vitriol), two ounces to a gallon of water, and be allowed to dry before applying the whitewash.

HEATING AND VENTILATION.

These are so related to each other, and are so important to health, as to require the attention of all. Probably more disease arises from impure air in houses and schools and public buildings than from all other causes combined. The larger proportion of diseases are those which first affect some portion of the breathing apparatus. In order to secure greater heat, air is confined, and so ventilation impeded. Many of the present heating devices heat the foul air in the room or depend upon a room supply. As a rule, it is much better to introduce into a room pure air which has come from without and been heated on its way to the room occupied.

Persons will bear change of air, even if a little cooler than the air of the room, much more than is supposed, if only it is introduced without draught. Mosquito wires are thus of value, during the fall, as impeding draughts of air, and yet allowing the air to pass in. The placing of a small strip under the base of the lower sash, so as to make an entrance place for air between it and the upper sash, and yet have no direct draught, is of much service. All occupied rooms

should, each day, if possible, be flushed with air when the inmates are out. This is especially important to school rooms, factories, public halls, bed-rooms, etc. It is a mistake to suppose that every corner of a room gets good ventilation by the opening of a single window when there is but little stir in the air. Experiments show that air clings to surfaces; that the sides and corners of rooms often have air much fouler than that found in the center. The distribution of heat in a room is a pretty good index of the distribution of air; and this is found to be quite variable. "If air is admitted at a high temperature, and allowed to escape through openings at or near the top of the room," it does not ventilate the room much. "Where heated fresh air is introduced, as where buildings are warmed by hot-air furnaces, or by steam coils placed in the basement, the air enters the room at a comparatively high temperature—too high, in fact, for either comfort or health. In all cases it should be possible, by the operation of a valve, to permit more or less cold air to mingle with the heated air, and this should be done in such a way that the temperature of the air admitted into the room can be regulated without at all diminishing its quantity."

School buildings and all factory buildings in the State should have expert examination to determine as to their fitness to conserve the health of those who are employed in them. All experience is constantly attesting that no device will supply the absence of that pure outer air of which oxygen is so large a constituent. Dr. R. Angus Smith, one of the inspectors and chemists under the Rivers Pollution Prevention Act of England, in closing a report of one hundred and eighteen pages, says: "This report may be said to be chiefly on the value of oxygen in destroying putrefaction, in oxidizing impurities of nearly all kinds, and, of course, in preserving water and air from the unwholesome agencies to which they are exposed."

MOISTURE OF AIR ARTIFICIALLY HEATED.

In the last report, the principles which determine the moisture of warmed air are plainly stated in an article by Prof. C. F. Brackett. It is there shown that the condition of humidity is a relative one, the adjustment of which depends upon the adaptation of heat and moisture to varying conditions of outer moisture, and of room heat and atmosphere.

Prof. Kedzie, in the first Michigan report, in speaking on this subject in reference to school rooms, says:

"In many cases the out-door air is heated to the requisite temperature and brought into the room without any addition of watery vapor. Many persons forget that the capacity of the air to hold watery vapor increases much faster than the temperature. For example, air at 32°, saturated with watery vapor, if heated to 60° without either loss or gain of watery vapor, would be excessively dry. If we represent the humidity of air saturated at 32° as 100, the same air heated to 60° would have a relative humidity of less than 15; or it would hold less than one-sixth of the water it was capable of holding in the form of vapor at the latter temperature. Lehman has shown that the exhalation of carbonic acid in respiration is very sensibly influenced by the amount of watery vapor present in the inspired air. This may explain why persons are so often afflicted with headache when breathing very dry air, and why relief is so soon experienced when the air is moistened by placing a dish of water to evaporate on the stove. Buckheim has also shown that the depth of the inspiration is decidedly influenced by the presence of watery vapor in the air. The influence of excessively dry air on the naturally moist mucus surfaces is injurious; the nostrils become dry and irritable, and a tendency to catarrh is established. Most persons have observed the relief obtained by breathing air saturated with moisture ('inhaling steam') when they have taken cold, or 'have a sore throat.' The influence of too dry air on the eye is also injurious, from the unnatural drying of the normal secretions for moistening the eye.

"The air in the school room should be three-fourths saturated with watery vapor. The best way to test the degree of moisture is to suspend two thermometers side by side, one in the usual condition, the other with the bulb covered with a thin piece of cotton cloth kept constantly moist by dipping a portion of the cotton in a suspended cup of pure water. The difference in temperature between the wet bulb and the dry bulb thermometer will indicate the relative dryness of the air. Thus, if the dry bulb marks 65°, and the wet bulb marks 60°, the air is exactly three-fourths saturated, and the difference between the wet and dry bulb thermometer should not exceed 5° in any school room."

"The capacity of air to contain moisture is greatly increased by the elevation of its temperature."

"One effect of heat upon air is to raise its point of saturation. One cubic foot of air, say at 32°, is capable of containing a certain quantity of moisture, and no more. But if we raise its temperature to 80°, which is near that of the human body, it is capable of containing five times as much, and, consequently, it absorbs moisture from everything that contains any. This heating of the air does not dry it in the sense

of extracting moisture from it; it only increases its capacity of containing water, thereby rendering it more absorbent or thirsty. Air suddenly heated is thus rendered unwholesomely dry, and this is an important point in regard to the subject of warming, requiring careful consideration. Whenever the fresh air is warmed before being admitted into a room, an evaporating pan, or some other means, must be provided to supply the air with the necessary degree of moisture."

The illustration of Prof. Brackett, is that, with an outside cold of 32 F., and an inside warmth of 62 F., from a vessel of one foot area, with water so placed on a stove as that it will be kept at a temperature of 122 F., we would secure an evaporation of somewhat less than a half a pound of water an hour.

In advocating the use of water warmed in this way, we are not to be entirely governed by abstract questions relating to moisture or relative humidity. Mr. Robert Briggs, in his excellent paper on the Relation of Moisture in Air to Health and Comfort, while doubting our ability to determine the regulation of artificial water-pans by our knowledge of the physical laws as to the relation of moisture to air, says:

"It must be admitted, however, that some small degree of hydration is a necessity for comfort, and with comfort for a demand, some reason may be found to establish the healthfulness of the small supply. It is certain, from all experience, that from 5 to 10 per cent. of moisture can be added to air after it is heated, certainly with much relief, especially to the eyes, with apparently little harm, although such addition may make the occupant of a heated room a little delicate as to outdoor exposure. Moisture may, to some small extent, be abstracted by the means of heating, especially when the heating is by stoves or hot-air furnaces; at all events, the presence of a sheet or surface of water, over which the heated air is allowed to pass, is now a recognized means of supplying a small quantity of aqueous vapor to air of ventilation. But the quantity supplied in this way is very small in comparison with what is needed for complete 'hydration,' or even for what can be denominated 'hydration' at all, in the sense of a summer condition."

"It is very difficult to find any hypothesis which will account for this requirement of a small supply of vapor with heated air, when we admit, or can demonstrate, that the sufficient quantity to the senses is so far below what is needed for hydration, and so independent from the moisture condition of the air; for nearly the same small quantity of vaporization seems desirable in air heated from any temperature. The explanation of the offensiveness of heated air-currents has been sought with much diligence, and, at times, causes have been assigned with much positiveness."

After noticing the fallacy of the ozone and electrical changes of condition as grounds for this need, he says:

"Altogether, the whole resolves itself to the reiteration of the bare fact, that it is comfortable to evaporate a small quantity of water in heated rooms, and that it can be done without marked injury to the occupants or to visitors. The quantity itself seems to be almost constant for all temperatures or hygromations of the air, and to be a slight addition only to the moisture in the normal air out of doors at any time."

Dr. Billings, in his letters to a young architect, on ventilation and heating, speaks thus:

"In living rooms, heated by a hot-air furnace, or by indirect radiation by steam, the use of a large coarse moist sponge in front of the register will often be a source of great comfort. Vessels of porous clay, through which water percolates rapidly, are used for the same purpose.

"This brings us to the question of attempting to regulate the moisture of the air in connection with apparatus for heating and ventilation. The precise influence which either the absolute or the relative amount of moisture in air has upon health is uncertain, for habit enables man to undergo great variations in this respect without marked ill-effect."

"The effects produced in air by artificial heat, and which, by some, are supposed to be connected with moisture, are important, and merit more study than they have yet received. .

"Dr. Ure describes the effects of the use of highly-heated cockle-stoves to be tension or fullness of the head, flushings of the countenance, frequent confusion of ideas, coldness of the extrémities, and feeble pulse. Hood confirms this, and states (p. 326) that he examined a school heated in the same manner, and found it to be so pernicious to the health of the children that they occasionally dropped off their seat in fainting fits. He goes on to say that 'these pernicious effects, although generally in a somewhat less degree, always result from the use of intensely heated metallic surfaces. They are, however, much modified by tempering the air by the evaporation of water. In Russia and Sweden, the Apennines, and other places where close stoves are used, an earthen vessel of water is always placed on the stove for this purpose, and greatly mitigates the oppressive effects which would otherwise be experienced."

He then asks the question—"If it is not the dryness of the air which causes the disagreeable sensations, whose frequency in furnace and steam-heated rooms no one can deny, what is it?" and adds, as follows:

"My answer is, that it is no single cause, but a combination of a number of causes. The first and most important is the want of sufficient fresh air to insure satisfactory ventilation. The amount of air required for this purpose, if admitted after passing through the heating chamber of an ordinary furnace, would soon make the room insufferably hot, for on a cold day its temperature from the common forms of apparatus will average 180° F. To prevent this, the register is usually partially or entirely closed as soon as the room becomes unpleasantly warm, and the fresh air is thus shut off as well as the heat.

"The second cause is the contamination of the fresh heated air by gases from the furnace, and especially by carbonic oxide. This will be found to be the chief trouble in those cases where a dull, persistent headache, with the feeling as if an iron band were bound around the head is produced, or in such cases as those mentioned by Ure and Hood.

"From hot-air furnaces these gases pass mainly at the joints, and the more joints a furnace has the worse it is in this respect.

"A very common cause of impurity in air heated either directly by furnaces, or indirectly by steam or hot water, when the furnace is in the cellar, is leakage from the cellar into the cold-air flues or chambers. Brick piers, enclosing coils or radiators, are quite pervious to air, and the pipes or box flues used to bring fresh air to the heating surfaces leak very decidedly in the majority of cases.

"A very common method used by servants for diminishing heat is to open the furnace door, and at the same time to obstruct the draft below. This gives rise to large volumes of carbonic oxide, some of which will almost assuredly escape into the cellar, and it requires the presence of but a very little percentage of this gas to produce bad results.

"The last cause of discomfort which I need mention here, is overheating in rooms which are occupied by a number of persons."

It is now generally conceded that the benefit or comfort derived from the evaporation of water on a stove is not to be accounted for merely by its direct effect upon the humidity. Dry air, in the open, is often very healthy and invigorating. On the other hand, where the degrees of moisture approaches closely to saturation, and the temperature is pretty high, the air becomes sultry and oppressive as interfering with evaporation from the person, etc.; where there is overmoisture, it tends to attract to itself organic particles. Thus, even the hand held closely, for a time, against the walls of a sick room or hospital will show odor from the effects of the moisture. A continuous moisture in illy-ventilated or sick rooms tends to promote or develop disease. "Our dwellings, although the water-troughs of our hot-air

furnaces do supply limited quantities of vapor with admitted comfort, do not, as a rule, have over 30 to 40 per cent. of humidity in the air within them."

The most probable view of the benefit of this slight added evaporation is that the moisture or vapor thus given to the air attracts to itself dust and organic particles which are thus, as it were, retired from the in-breathed air, and so settle as to be removed or changed by ventilation, sweeping, dusting and general cleanliness. The benefit is not so directly in diminishing the dryness of the air as in furnishing such small degree of extra moisture as will get, in company with floating organic material of any kind, volatile gases, and cause these to be somewhat settled or disposed of by vapor. "Organic matter appears, mainly, to be in connection with the vapor in the air, and not to exist as a separate gas diffused in the dry air when the vapor is removed by natural causes." Thus, while there is still a field of inquiry, it can be said to be the opinion of authorities, as well as the experience of individuals, that water kept at a temperature above 125° on a stove or in a water-holder in the register, or a sponge, adds to our sense of comfort when occupying artificially-heated rooms. The water-holder of the furnace is not so direct in its effect on the air coming into the room, as is that on stoves or in water-holders in registers, unless the air is heated where the holder is, and is then introduced into the room as by the indirect method. As the water-holders are arranged on many stoves, the water never becomes warm enough to be of any service. It is often well to fill the water-holder with water already quite hot.

SCHOOL HYGIENE.

To all who have studied the welfare of population as related to physical care, it is evident that the most important reforms, both as to personal and public health, must begin in a proper training and instruction of the children of the State. Personal habits fully formed are always hard to change, and hence success in prevention requires early discipline. Also, where nuisances or conditions unfriendly to health have come to be tolerated, it is the more difficult to convince people of their evils and so to secure relief. That there are great defects in physical child-training and care is no longer a matter of general observation. In examinations of homes, and of the conditions to which children are subjected in school-houses and factories, and of classified particulars as to the results of imperfect methods, illustra-

tions of wrong seating, imperfect light, bad air, have so multiplied that no longer can school boards or factory owners brush aside the facts in evidence.

Insanitary conditions are recording their results upon our population. By enforced inheritance, or by personal and acquired disabilities, many are made to worry through life with a burden of ill health or reduced vigor, and so evil comes not less to the State than to the individual. While there is a tacit consent to this fact, and a respectful patronage of such views, as yet there is no adequate training and instruction in the practical administration of hygiene. Instead of the floating knowledge which most teachers are presumed to possess as to proper hygienic conditions, both for the child and his surroundings, there should be such definite information as will enable the teacher to exemplify, to teach and to carry out a proper bodily discipline and education. We are glad to say that the State Superintendent and some of the city superintendents of schools appreciate such views, and would be glad to see definite provision for such instruction. It would include not only a proper assortment of calisthenics, gymnastics and athletics, but instruction in all those details which direct the child as to personal care and habits, and make him intelligent as to the management of a machine of which he must be the chief superintendent through life. All the members of the Board have been earnest in their endeavors in this direction. A circular issued this year has been largely called for in the State, and, where teachers and superintendents have shown an interest, has had extended distribution. We had hoped that, ere this, the Normal School would have had some definite provision for fitting its pupils to teach the principles and practice of hygiene. If many of its graduates are employed as teachers in the State, this would be the most ready method of reaching the various district schools. Independent of this, the city and county superintendents can do much in the important relations they bear to the public schools. To-day the school system of the State admits of greater improvement in this direction than in any other. We are not sure but that, in a social aspect, the care of the health is as important as care of intellectual education. We are sure that it is just as sensible to leave the childhood of the mind without instruction as it is to leave the childhood of the body. Unskilled instinct will do about as much for the one as for the other. Care of the growing child, as to health as well as to mental drill, belong to the economies of the State. It has a right to be recognized in the fund which the State provides to

secure the welfare of its people. For, whatever gratuity the State confers on its children, it confers in order that they may grow up with such bodies, minds and characters as shall give strength, prosperity and stability to the State. This Board, therefore, begs leave to call the attention of your Excellency, and of the Legislature of the State, to child-care—the preservation of its life and health, in home, in school, in factory—as a great civic duty and a great civic policy. The outcome of its neglect is not only sickness and death, but diminished industrial and productive abililty, a burden manifesting itself in various forms of thriftlessness, finding its outcome in generally increased taxation, and in that special form of heavy expenditure and loss which pauperism, insanity and crime entail.

SANITARY EXAMINATIONS.

The feasibility of sanitary and institutional examinations has been well illustrated during the year. The Board, by its visits and correspondence, is able to give guiding information, to correct many errors, and to outline plans which local authorities can investigate and execute. Not only has this resulted in great improvements at most of our summer resorts, but Boards of Health throughout the State come to be inquisitive as to what needs to be done and intelligent as to methods, even where conditions of inability or inexpediency postpone what will eventually be accomplished. As a distinguished lawyer of this State has expressed it, "the occasional failures which come to notice are but the indices of innumerable successes that have been made in various parts of the State, and have resulted in a more general and intelligent attention to the conditions promotive of good health." It has often been the duty of the Board to be very explicit in its disapproval of local conditions, and it is an index of popular sentiment that so generally there has been effective response to the suggestions made. Not only in State institutions, but in county institutions, we have found the officers ready to consider defects and to remedy as fast as circumstances would allow. While many institutions are models of care and of discipline, others have been found that needed thorough change of method. The habit of personal and close examination on the part of committees or directors, is not the rule, and even where it has been attempted, some evils are overlooked, which are readily admitted when pointed out by those of greater skill or experience in this particular direction. While special inquiry into

personal conditions will now probably fall under the care of a Council of Charities and Correction, this Board will still coöperate in careful sanitary oversight and insight.

INDUSTRIAL TRADES AND FACTORY OPERATIVES.

The attention now being drawn to industrial trades in factories, to factory labor in this country, and to the health of operatives, in the interests both of their health and of prosperity for the State, is very important. In coöperation with this work, the Board issued an industrial circular of "Health Counsels for Working People." We have also examined into the various laws regulating factory labor in England. While there may be some difference of opinion as to the practical methods of carrying on factory inspection and regulating the health interests of workmen, we must feel that such matters cannot be wholly left to the judgment or inclination of employes.

EFFLUVIUM OR ODOR NUISANCES.

Complaints not infrequently reach us as to the establishment of factories or other works which, either by organic putrescible matter directly infused into the air or through disagreeable smoke, cause great unpleasantness or sickness to the people of the vicinity. The laws of New York have become very stringent as to such evils, and too often location is changed to our own shores. Some of these occupations might be conducted without harm if proper machinery for wetting or consuming the organic matter was employed and the stokers or other workmen were always diligent in service. Others are so vile, as like nitro-glycerine factories or powder magazines, needing to be located far from the haunts of travel or of trade.

It is always in the interests of cities and townships, when such a factory is being located, to inquire into its character, and for the City or Township Board of Health either to seek injunction or to notify parties that they will be held from allowing their factory to become a nuisance. Where there is already complaint both common law and special statutes provide modes of procedure. While all proper local industries should be encouraged, it is to the interests of each locality that its people be protected from trades and occupations injurious to the general health, or so annoying and distressing to the average inhabitant as to cause such discomfort and impurity and nauseousness of air

as is an infringement upon the inalienable rights of the citizen. From Bayonne, Woodbridge, Belleville, etc., serioûs complaints have reached this Board. Local authorities, under proper legal guidance, have, by the laws of this State, great control over such nuisances. While workmen in these and other industries may for a time seem unaffected or may even survive any perceivable injury, statistics as well as experience show that race vitality is deteriorated.

CONTAGIOUS DISEASES OF ANIMALS.

The laws relating to the contagious diseases of animals, as in operation in this State, require careful oversight and administration. These diseases are of great interest as comparative studies, and as affecting the meat and milk supply and the revenues of the State.

While contagious pleuro-pneumonia has occurred only in a few localities, it still claims large attention. The removal of some restrictive laws in New York State has exposed us to the contagion from that vicinity. There is need of some national legislation to regulate the inter-State traffic, so that it shall not be too restrictive, and yet secure a registry of dealers and some inspection.

Our chief outbreaks have been in Hudson, Essex, Union and Hunterdon counties, and in these mostly confined to single neighborhoods. In accordance with a provision of the law since January, 1883, we have permitted inoculation of infected herds where the disease threatened to spread. Our experience with it has been satisfactory; but it is plain that it must be kept under strict State supervision; if not, it will be spread by those mingling with the disease, or its unskillful doing will lead to false security and disappointment. Some, in ignorance, have proceeded to inoculate before the facts were known to the Board; but this has never been from intentional disregard of the law on the part of owners. Here and there we have evidence of bad intent on the part of dealers. An occasional suit at law is necessary, and thus far the courts have fully sustained the law.

This is becoming more and more a milk-producing State. The amount invested in cattle is so large as to make it a great interest to protect herds from diseases which arise only from contagion. All details as to the execution of this law will be found in the report which we are required to make to the Board of Agriculture.

A serious outbreak of glanders, in a car stable at Newark, required the slaughter of about forty horses. The Board was able to coöperate

with the local authorities, and with the owner, in the eradication of the disease. Fortunately, no more contracted the disease; although it is one of the few diseases that is sometimes contracted by the exposure of torn or abraded surfaces thereto. A few horses beside these have been found affected in other parts of the State, and have been destroyed. There is need of more watchfulness against this disease. Often it does not incapacitate the animal from work, and so is apt to be spread. A special law makes it an offense to keep a horse thus diseased. The law, also, as to cruelty to animals, has been brought to bear against the use of horses which have contracted the disease. The proper transportation of animals is a matter that, not only in humane interests, but in those relating to food, should receive more attention.

Local Boards of Health have it in their power to do much to prevent the spread of these communicable animal diseases. The assessor, or other officer, should know where animals are kept, and if there are any losses. In cities, all keepers of cattle should be registered. It is a duty which local health authorities owe to the public to see that such sickness is not spread among herds, and that the people are not imposed upon by the sale of animals so affected as to be unfit for food. We are glad to say that, in the administration of this law, we have been much aided by the approval of the Board of Agriculture, and the good sentiment as to it that obtains among farmers aware of its provisions.

COMMENTS ON LAWS.

In the last Report, a full index of laws relating to public health was given for convenience of reference. (Sixth Report, 1882, pp. 255–260.) Of these, the laws which are oftenest referred to, as related to the present work and authority of local Boards, are as follows:

Chapter LXXI.,	page 117,	Laws of 1879.	As to vital statistics.	
" CLV.,	" 206,	" 1880.	As to local Boards, etc.	
" CXXV.,	" 160,	" 1881.	" " "	
" CLV.,	" 217,	" 1882.	" " "	
" CV.,	" 119,	" 1883.	" " "	

The chief acts of the Legislature of 1883 relating to public health were as follows:

Chapter	XVII., page 25.	As to sewers.
"	XXIV.	Allows cities to increase appropriations for public health.
"	LVII.	As to the employment of minors.

Chapter	XCVII.	Regulating the sale of petroleum and its products.
"	CIV.	As to pleuro-pneumonia.
"	CV.	As to local Boards of Health.
"	CVIII.	As to practice of medicine and surgery.
"	CXXXIX.	Adulteration of foods.
"	CLIV.	Burial of all small or other animals.
"	CLXXXV.	As to skimmed milk.
"	CLXXXVIII.	An act to authorize and enable small land owners to drain and improve their lands.
"	CCV.	Council of State Charities.
"	CCVIII., page 259.	As to sewers in cities of the first class.

A few other laws were also passed that had a collateral reference to matters affecting the public health. There is need that new laws introduced be compared with laws already in existence, and that there shall not be unnecessary multiplication of statutes. It will probably be necessary ere long for the Board to collect and codify the various laws relating to public health. They are, however, easily accessible now, and when needing any special explanation, the opinion of a lawyer who is fully conversant with all the laws passed is better than the ready interpretation of those of less experience. The many laws and sections of laws impose duties on the State Board, and these from time to time have had some addition or modification.

Two or three changes made last year in the law as to the contagious diseases of animals, have made it more facile of application. Some farmers claim that when inoculation is done in an infected herd, to prevent contagious pleuro-pneumonia from spreading, it should be done at the expense of the State.

The law more closely defining the powers of local Boards, Chapter CV., 1883, and giving summary proceeding before Court of Chancery, was a valuable addition to the health legislation of the State.

The drainage law, to authorize and enable small land owners to drain and improve their lands, is in the interests of health as much as of property.

The law as to petroleum and its compounds is now found very effective, and it is doubted whether any more legislation is needed as to it. In some cities, local authorities might aid in the collection of samples and frequency of examinations.

The law as to the adulteration of foods, drugs, etc., led the Board to appoint a Committee or Council of Analysts. Considerable preparatory work has been done with little expense. We do not deem it necessary to repeat many chemical analyses already made, and are

aiming so to adjust and administer the law as to reach adulterations injurious to health, and next such fraudulent admixtures as reduce needed food values. While we cannot report much activity in the application of the law, it has not been neglected, but given time for cautious preparation for future inquiry.

We have had many attestations of the value of the present general milk law of the State, and have not been made aware of any cases during the year where it is complained of as invading private rights. As our relation to this law is incidental, and as it was framed as a measure of protection of farmers, we refer for further information to them and to the Milk Inspector. He has proved himself faithful, honorable and efficient in his duties.

The law passed last year constituting a Council of Charities and Corrections is capable of being applied with much advantage to the State. In our sanitary inquiries and personal visitations, we shall be glad to coöperate with those who may be chosen to fulfill this trust.

The law as to medical registry was so far perfected last year as to secure an index list of all those who have complied with the law of 1880, and the supplements thereto since passed. Some, who had filed their diplomas under a former law, did not understand these more recent laws to necessitate a re-file or re-registry, although, taken as a whole, they evidently mean this. With a few exceptions they have been so understood.

Had the index reached back to the first New Jersey law, it would have been impossible to have secured a roll of names that would have given any correct list of present practitioners. As it is, the lists will be found quite complete, and any additions to be made will be supplied the next year.

It has been recognized by some of the States, that the coroner law, similar to our own, is defective in method in securing reliable results, and is very expensive. Consequently, some of the States, as Massachusetts and Connecticut, have made a radical change which has commended itself to the lawyers and physicians of these States, as well as to the general public. This matter has been brought to the attention of some competent persons in the State, and it is hoped that ere long some legislation will be secured more simple and effective for the ends designed.

A law, in some form, regulating the connection of houses with sewers and cesspools would greatly decrease the risks to the general

health which now occur from hidden and imperfect work. The influence of private dwellings on public hygiene cannot be disregarded. The principle of inspection of buildings, in order to insure safety, is now well-established in various cities. Because of its extra hazard, it is not invidious to select out the pipe-work of houses as demanding some special oversight. While a law, introduced last winter, did not fully commend itself to our judgment, we beg to express the view that some legislation as to it is desirable, so as to be applicable to such cities as, in the esteem of local authorities, may need it.

It can be said, in general, that the State has been wise and liberal in providing laws conservative of the public health. While it insists that no private property shall be entered upon without permission of the householder, except by due process of law, it does mean that nuisances, hazardous to health, shall not be legalized, and that they shall be reached by proper process as speedily as a due regard to individual rights will permit. Increasing intelligence, as to health matters, on the part of the people, increasing demands for cleanliness by those who seek homes in boarding places or health resorts, and a clearer and fuller knowledge of their powers and their proper exercise by Boards of Health, will much aid in diminishing the frequency and extent of preventable diseases. While the time will never come, that there will not be those who quarrel with just and equitable laws, because of their own misconceptions, yet, in such a line, even contention and occasional triumphs on the part of offenders, as a rule, result in a greater regard for the necessities of relative duties, and of consent to the ordinances which a proper regard for the health of the people requires.

CIRCULARS, LIBRARY, ETC.

Circulars which have been issued or re-issued by the Board this year will appear in the Report. Former circulars can be had by their numbers as they appear in the Sixth Report, except that No. 37, as there given, should be No. 38.

The library of the Board, both by exchanges and purchases, is increasing in value and importance. It is accessible, as heretofore, and is of much service to individuals and to local Boards. The catalogue is contained in the fifth report, and the list of additions will appear next year.

A paper on "Cemeteries and Interments in Cities," which was deferred from last year, will be found in this report. An extended

contribution, both to the literature and experience of the past as to interments, by Stephen Wickes, M. D., is to be found in the transactions of the New Jersey State Medical Society for 1883. It is hoped that these two papers will lead to greater caution in the location and management of cemeteries. The choice of locality should be regulated by local health authorities.

The various papers contained in this report have been prepared with reference to general needs, and so as not to repeat the information contained in former reports.

It is the constant effort of the Board to furnish such information as will be of permanent value to the households and the people of the State, and such statistical and other facts as will aid in the prevention of disease.

EXPOSURE AND DISEASES OF OPERATIVES.

This year the Board has made a preliminary inquiry into the chief exposure and diseases of a few classes of operatives. It is hoped that we shall be able to follow these up with observations by those who live or practice much among special classes of tradesmen.

The influence of the inhalation of dust, in many occupations, is such as to have given a special name (pneumokoniosis) to diseases of the lungs caused by dust. Dr. Birch-Hirschfeld, in Vol. II. of Dr. Hermann Ealenberg's Handbook, thus speaks of it:

"Formerly the question was considered only in reference to the merely mechanical action of dust or it poisonous properties, as in the case of arsenic, &c., but the researches of Koch, and especially his discovery of the tubercle bacillus, have given a new feature to the question.

"The greater frequency of tuberculosis among persons working in ill-ventilated and dusty rooms is well known, but there seems now good grounds for believing that however much these conditions may favor the development of tubercle, and though dust *per se* may lead to various pulmonary disorders, actual tubercle originates in direct infection from the inhalation of the bacilli present in the atmosphere of such workshops. And this view is supported by the greater frequency of tubercle among persons working together in numbers than among those equally exposed to dust, but following their occupations alone or at home.

"The diseases immediately brought about by the mechanical action of dust are quite distinct from tuberculosis, and are chiefly, more or less, chronic bronchial catarrhs, leading to bronchiectasis, emphysema, chronic catarrhal pneumonia, and consequent ulceration and destruc-

tion of lung tissue, interstitial pneumonia or cirrhosis of the lung, in fact, all forms of non-tubercular phthisis.

"Acute pneumonia, too, seems, from the observations of Hirt, to be much more frequent among persons employed in dusty trades, and more so when the dust is of a mineral than of an organic kind. Indeed, the greater irritation produced by the former, apart from any chemical action or toxic property, is well known. The majority of the particles, it is true, do not reach the ultimate divisions of the bronchi, and are carried back by the cilia, so much so, that after a short absence from such exposure the whole are removed, and the effects must be mostly reflex, or conducted to the vesicles from the actual seat of irritation, but a portion does certainly remain. Inorganic and other particles are found in the expectorated cells, and *post mortem* in the cells and lymphatic vessels and glands. Merkel found in the lungs of needle grinders, as much as .8 per cent., and Zenker 1.45 per cent. of iron, while the ash of the lungs of workers on French mill-stones examined by Giesseler contained thirty-four per cent. of silica and ten per cent. of alumina. To these conditions the names of anthracosis, siderosis and chalicosis have been given. The inorganic particles are deposited in the upper lobes and around the root of the lung more than elsewhere.

"Cotton dust tends to a form of pneumonia; and Zenker found among cigar-makers marked atrophy of the lungs, together with deposition of brown organic particles, though whether any connection subsisted between the two conditions cannot be proved."

HEALTH IN THE HOME AND ITS SURROUNDINGS.

BY EZRA M. HUNT, M.D.

Whatever may be the extent and perfection of public health administration, as conducted by civil authorities, it will yet remain that the health of the people largely depends upon the sanitary condition of the house and immediate premises of the occupants and the sanitary care of the household. It will, therefore, be the design of this paper to furnish a plain outline by which the ordinary householder may know how so to regulate a house and its immediate surroundings as to make it promotive of the health of the occupants.

DRAINAGE.

In choosing or building a house the first essential is the securement of proper arrangements for the keeping of the *ground* under and about it in a condition favorable to health. This always means that there should not be such dampness of the ground as is caused by water stagnated in it or by a high water level.

There are some prominent reasons why a lot of ground that is to be occupied by buildings needs underdrainage.

There is no such purifier of ground as air. No ground is so solid as that there is not either air or water in the interspaces between the earth-particles. That this amount is very considerable you may easily test by filling a glass with dirt and seeing how much water you can pour in it. If the dirt is dry the amount of water that you thus pour in shows how much air was in the glass between the particles of dirt, for the water only takes the place of the air. If the ground is thus kept full of water it expels all the air except the little that mingles with the water itself. Now, we know that not air and water, but *cir-*

culating air and *circulating* water are the two great agents for keeping the ground in a condition favorable to health. We secure both of these by securing a low water level in the ground, so that air can circulate down to it, and so that the water coming from the clouds can also circulate in the soil and not find it already full of stagnant water. To accomplish this, deep underdrainage is often necessary. As the ground differs very much in natural degrees in different places, and as the soils and underlying strata differ very much, according to the geological structure and artificial additions, the depth at which it is necessary to lay tile in order to secure circulation in the upper ground and a low level of the ground water is very different. The farmer is not slow to find this out about his fields, and the builder who finds out whether he is building on clay, or gravel, or sand, or alternate layers of these or in a muck bed, is not slow to find out if he will. We knew a man who dug out a pond on a hill and built a house over it without any drainage except enough to carry off the standing water from the pond. It was a fine-looking house, but became notorious for chills and fever. We know an eminent engineer who claims that in most cities there is need of drainage to the depth of fifteen feet. This view is based on the fact that most cities are built near streams of water, where the natural water level is not very low; that as buildings shut out sunlight and air, evaporation goes on slower, and storm-water and the absence of prolific vegetation add to the ground moisture. This is all true. Many cities are now suffering from ground saturated with water more than from any other cause. This shuts out the air which would otherwise circulate and oxidize filthy matter and take care of it. It is wonderful what an amount of compost or organic matter the ground will take care of if only it can be allowed to have air in it and the water that comes from above circulating through it. But, if you shut these out, stop cropping the ground, and then by building on its surface increase dampness, you interrupt nature in one of its chief arrangements for health. Drains, therefore, ten to fifteen feet below the surface, are not extravagant for some parts of cities, but much will depend on the character of the soil. At any rate, no house should be built, either in city or country, until the builder has arranged to make the usual level of ground-water below the cellar, and many feet below the surface of the ground. Where the general water level about the house is high, it will often be necessary to have all the drain-pipes, under or around the building, converge to one general drain-pipe outside, which shall carry the water off to a lower level to a soil which is more

absorbent or a stream that will convey it away. It is also to be remembered that the level of dampness in the soil is above the level of ground-water, varying according to the character of the soil. For all soils are responsive to capillary attraction, by which the ground just above the level of complete saturation, is kept wet by the adjacent water. As drain-tiles are meant to take in water from the ground, they are not cemented as for sewers. Their size, the nearness of successive rows, the direction of outfall, etc., are all relative questions. Even when they are not filled with water they serve as air-tubes, and thus aid in the airing of the ground. We have seen one public alms-house in the State in which they were made to have openings on the surface on purpose to secure better soil-airing.

Many houses already built could be made much dryer and healthier by deep drainage about them. Others, where the ground is clayey or hard, could be helped by a substitution here and there of gravel and sand through the natural soil. All details cannot be here stated, but the householder who will keep prominently in mind the fact that only ground in which the water level is such as to allow the circulation of air beneath and around the building, is fit for occupancy, will find many things to guide him. If it is a place hard thus to dry, he will not pour the water from the roofs on this ground, or shade it with heavy foilage, so as to keep out sun and air, or otherwise embarrass a circulation in the ground, as important to its healthfulness as is pure air to his own lungs. In general, roof-water should not fall about the house, but be carried off. Sometimes, because we have not the means, or because our neighbor's lot is not thus kept breathing, we have to resort to various devices in order to secure dryness. The walls of the cellar are made so as to get air from the outside, as when an area is built about them, or they are built mostly above ground, or what is called a damp course is put in the wall. This is made by building a foundation of concrete or cement, and then putting one course or more of an impervious layer of slate, or cement, or asphalt, between the courses of brick or layers of stone work; also a double course of slates in cement is laid along the wall just above the ground line, or vitrified stone-ware perforated with holes, is sometimes used. If this is not done, in very damp ground the stone or brick often carry up the water by capillary attraction, so as to make the walls of rooms damp. The bed of concrete, or cement floors, used in basements, are an aid and are for the cellar and rooms above, what the damp course is for the walls. Stone and brick vary much in their degree of

porosity, and for foundations the best should be secured. Where we cannot wholly remove dampness, it is often best thus to cut it off, although we are to remember that we cannot wholly shut out ground air, and had better be radical enough to attempt to have it pure. The importance to be attached to the location of dwellings on *ground of circulation*, instead of on water-logged soil, has never been sufficiently estimated, since the vapors arising therefrom are too often laden with organic or specific disease particles, for which moisture as the carrier and the heat found in the dwelling furnish the disease-breeding conditions. This is all the more significant since now many diseases seem so intimately associated with low forms of vegetable or fungoid life. Ground thus becomes foul and is deprived of its self-cleansing powers, and its air is as prolific of disease as is the foul air of the sewer. Fungoid soils or localities are not good for building ground. Avoid a mouldy home.

HOUSE CONSTRUCTION.

The idea of a perfect building material is but an extension and modified application of the idea of a perfect ground structure on which to build. While there is more need of compactness in order that it may resist or accommodate itself to forces above ground, the idea of porosity or perviousness must be preserved. It must be material which admits of the circulation of air through it, yet in such a sieve-like way as not to cause draught. Brick, because it is a form of compact but aerated ground, and porous stone, because it is another form of earth structure, are valuable for this purpose. Some stone is so compact as too much to exclude air, and thus becomes too damp for building material. So walls may be painted and successively papered to an extent which makes them too impervious. The art of healthy house building is so to combine materials as to secure this properly distributed circulation of air, and if possible secure it at proper temperature, to govern the admission of light, as adapted to human beings, and thus follow out the natural laws which govern man in his relation to his inclosed condition, and the adjustments which within certain limits are allowable. But it is wonderful how wise it is for us in all artificial constructions to study closely the laws of natural philosophy, and not only conform thereto, but in deviations make our deviations on the basis of the law. It is of great import that now scientific tests unite with practical experience to enable us to decide many questions bearing on the welfare of life. We can accurately test the

quality of stone or brick, the angularity and quality of sand, the excellence of lime or cement, and whether the mortar is properly tempered. So brick, or blocks of terra-cotta, can be had of definite degrees of porosity, and even the various woods are closely tested, as well as the effects of varnish, oils and various paints. The right combination of materials to form a proper dwelling-house, as well as the right preparation of foundations, are well understood, but often greatly neglected.

HEATING AND VENTILATION OF HOUSES.

In the proper construction of a house so as to have a dry cellar and surroundings and dry walls, we take the first step toward proper heating and ventilation. Thus the circulation of the air is properly maintained in the inclosure and the dampness does not abstract the heat which is provided. In a house thus built the problem is merely that of bringing up the temperature of the air in the building without subjecting it to too rapid cooling from its surroundings. The demand for ventilation arises from the fact that rapid circulation of air is impeded by the inclosure, and that our own breathing and the lights and fires, use up oxygen and supply carbonic gas, while organic or decayable particles are also more or less furnished to the air. Air which has six parts by volume of this gas to 10,000 parts of air has reached the extreme limit for breathing purposes, not only because of the carbonic acid it contains, but because in human habitations this is denotive also of an amount of organic matter exhaled from the lungs which ought not to be again inbreathed. The expired air has five per cent. more of carbonic acid than the inspired, and has lost slightly more than that of oxygen. It also brings out with it a varying amount of gaseous and animal matter, quite decomposable. In order to dilute this or to drive it out, air must get in generally at a rapidity of not more than two and a half feet per second, since faster than this a draught is created which, except in warm weather, would be too much for most persons.

If the room is too small or too near air-tight, or has too many people in it, or one person in it for too long a time, or has other sources of air contamination besides the person, its air will become foul faster than it is possible to bring in fresh air without a draught. One lamp or gas-jet, or two candles in a room burn out oxygen and introduce carbonic acid gas as fast as a person, and most of our larger gas-jets or lamps are equivalent in this regard to three persons.

The foul air produced by lights has no organic matter, but it diminishes our supply of oxygen and so lowers vitality and often produces headache and weariness and ultimate ill health. The introduction of the electric light, which does not thus consume oxygen, will be of great service. Gas stoves with no chimney consume oxygen and produce carbonic acid gas rapidly. Iron stoves raised to a high heat not only do this, but when nearly red hot the gases inside the furnace are readily diffused through the iron into the room, and especially carbon oxide, which is much more injurious than carbon dioxide or carbonic acid gas.

The common fire-place helps much to ventilate a room, since it draws to it the air of the room, which causes fresh air to come in from without; while it thus heats the air of the room, it secures a supply. It is, however, very expensive if we seek to heat the whole room, since there is so much waste of heat.

Where a furnace is used, situated outside of a room, if it has a proper fresh air box, it supplies fresh heated air to the room. If this is brought in without dust or too much dryness, it is a good kind of heated air.

Where hot-air pipes are used they do not introduce fresh air into the room, but simply heat the air of the room, pure or foul as it may be, unless, instead of direct heat, these pipes are so arranged in coils somewhere as to allow fresh air to be introduced and flow over them and then flow into the room and so supply fresh air heated by pipes of hot air. For this method of indirect heating the pipes need to be kept very warm.

Hot-water pipes or steam-pipes are on the same principle, the choice depending mostly on cost or on some questions as to the degree of heat to be maintained in the pipes and the effect as to moisture, etc.

We cannot here discuss so broad a subject as heating and ventilation, but only desire to call attention to the principles on which it rests. By properly sustained animal heat resulting from food, exercise, etc., and by clothing, we are to accomplish most, and then supplement by these more artificial appliances. Pure air needs to be heated less than foul air, for it gives more heat-producing power to the system.

"In our best houses the question of ventilation hardly arises, unless under exceptional circumstances," but in crowded rooms or very close quarters, there is often need of artificial arrangement. Additional remarks on this subject, with special reference to school rooms, will be found in the Secretary's Report.

HOUSE-PIPES.

The modern house has come to be largely an inclosure of pipes—so much so that the proposition has been made to first draw the pipe plan of a house, and then construct the house in reference thereto. We have already noticed the under pipes which have to do with drainage. We have, also, alluded to some pipes which may be needed in connection with heating and ventilation.

The other series of pipes which have most to do with dwelling-houses are gas-pipes, water-pipes, and pipes for the conveyance of sewage. Although gas-pipes can only be harmful by reason of leakage of gas so as to contaminate the air, or so as to cause fire in case light comes in contact therewith, it is very important that there be no leakage. The pipes need to be of good metal, carefully joined, and the gas-jets, such as will fully prevent any escape. This occurs more frequently than is supposed. It is often well to try occasionally the jets when they are believed to be entirely turned off, and, also, to have the examiner of the gas-meter see that there is no escape. The gas-meter itself sometimes has leakage in or about it, and this adds to expense as well as fouls the air. It is best to have all tubing in a house placed so as to be as accessible as possible.

WATER-PIPES.

The water-pipes of a house are of still more importance. Where water comes to a house by pressure, whether by natural gravity, or, after having been raised by engine-power to a reservoir or stand-pipe, the pipes are kept full, and there is but little danger of contamination. Even lead pipes are not so susceptible to action when constantly kept full of water. Where intermediate cisterns or standing water, in any form, is kept, it is to be remembered that it is an absorbent of gases, and that water may be fouled by impure gases or by organic particles passing over it. Even where the water-supply is constant, cisterns for the water-closet supply are sometimes advised on the ground that thus the water is kept more distinct from the general supply, and with some forms of closets the amount of supply is more easily regulated. But if provided, such cisterns should not be left long without use, and should not be so large or so located as to allow the water to become stale or to absorb noxious matters. As most water is not chemically pure, there is often more settling and quicker

spoiling than one would suppose. There are many waters which are used for drinking-water, which, if kept a few days in a long glass tube half full and corked, will, on opening, emit much odor from the change in the suspended or dissolved ingredients they contain. All standing water needs to be aired, and is better off where a draught can reach it than in some pent-up corner, in cellar or closet or attic. The agitation of water also helps to air and freshen it. It sometimes happens in cisterns, over water-closets, that the pipe leading up thereto is empty, the valve being at the bottom of the cistern, and so it is filled with foul air from the closet. This is not completely washed or driven out by the water, but, at the raising of the valve, some of it gets through to the water, and may even bubble up in the cistern. The valve, therefore, should be close to the closet. If this cistern has an overflow-pipe, it must not run into the general soil-pipe, for if it does, when there is no overflowing water, it serves as a conduit for foul air. Even if there is a trap, the water in it becomes tainted or evaporated by long standing. It can be conducted to a water-leader or some other point.

Where the supply of water to a house is intermittent, so that the pipes are not always full, or, as is the case where a pump draws the water into the house, especial care must be taken. If the pipe is of lead, small particles may become dissolved, and even the lining with tin does not seem to remedy this. Lead thus introduced in the system is a great risk to health. When water-pipes are empty of water, they are occupied by air. Therefore, we must see to it that the air which gets access is not foul air. We have known a faucet thus to open directly over the sink connected with a soil-pipe, so that if the faucet was turned when the water-supply was not on, the tube would be filled with foul air. This mode of water-supply is not now common, but, as defective pumps are often located directly over sinks, it is well to bear these possibilities in mind.

SEWAGE-PIPES.

The most prominent and riskful kind of house-pipes are those which have to do with the delivery of the various liquid and floating materials from kitchen, laundry, wash-basins, bath-tubs and water-closets. These are the pipes intended to carry soiled liquids, the main or upright one being generally called the soil-pipe.

It may be said first of all, as a rule: Do not give them an undue

quantity to carry. There is such a thing as an unreasonable production of material, and a useless addition of water thereto. There is much of dust and dry dirt that should never find its way into the pipes, but into the fire. There is much stuff that properly goes with the garbage for punctual delivery and does not belong to the soil-pipe. Laundry and kitchen slop fluids can often be largely disposed of upon the lawn or around vines without inconvenience. Water, with all its value, may be wastefully used, so as to cause unnecessary dampness about a building, and so as to too greatly increase the amount of delivery through pipes. Where the dependence has to be on delivery into an outside cesspool, or for soil filtration, this is a matter of great importance. Many households use double the quantity of water used by others and make it dirtier without any corresponding increase in cleanliness. All introduction of rain or roof-water into the pipes is an undue increase of quantity, unless needed for flushing purposes, which is not generally the case.

GREASE TRAPS.

It often happens that entirely too much grease gets into the pipes. It is in some respects the most unmanageable of all the outgoes from the household. It does not dissolve in water. It does not submit to oxidation, as does most organic matter. Besides its mechanical clinging to the sides of pipes, it resolves into fatty acids, which are as pernicious as the grease itself. The same is true of soaps, which after their use not only lose their cleansing qualities, but become sources of pollution. This class of products is much more easily handled by ground admixture and by chemicals than by suspension in water, or even in air. So often does the grease clog up pipes as used even in small households, that it is necessary occasionally to thoroughly scald out the house-pipe and make free use of soda, potash, or other alkali. More than any other one ingredient, it is the cause of that peculiar odor so characteristic of sewers and generally known as a sewer-gas smell. Where there is much grease, it should be removed by mechanical or chemical means before going into the pipes.

For this purpose it is usual to have what is called a grease tank or grease separator, made variously of brick, stone or vitrified earthenware. The design in these is to give the grease time for cooling and so to construct an intermediate trough or sink between the house and the delivery pipe as that the grease may rise on the top, to be occa-

sionally skimmed off, while the outflow takes place from nearer the bottom.

There are many special forms, such as that of Doulton, Carson, and the Tucker grease separator or cooler. The most feasible chemical method is probably that by the use of carbon bisulphide. (See Spon's Ency. Arts and Man., Vol. II., page 1455.)

It is some advantage to have the urine flow into the soil-pipe above the dish-wash, as it aids to clear the pipes of grease.

Thus having diminished the quantity and improved the quality of the sewage within reasonable bounds (most important where there are no sewers and not unimportant sometimes with these), the principal fact as to the removal is that it ought to be made *while the material is fresh.* This means that all particles of matter that are to be added to the house sewage, should be added before there has been decomposition or decay, and that soiled waters, such as laundry-water, slop-water, etc., should immediately after use find their way to the pipes and out of them.

The rule is that, in a health-preserving or disease-breeding sense, no such liquid or offaling is objectionable until from twelve to eighteen hours after its production or voidance. Hence, all arguments as to the insanitary effects of its handling, or of its conveyance to rivers, are futile, if only you insure prompt delivery. To call it *filth*, in a disease sense, at the start, and to argue against its conveyance because it has odor, or because, by detention, it becomes pestiferous, is no more reasonable than to judge tomatoes unwholesome because decayed tomatoes are sickening. This point is important to be made, because so many arguments as to river pollution, or as to the evils of other transportation and delivery of sewage, are based upon the assumption that fresh sewage is unsafe. It is only unsafe to those who store it, or who do not succeed in getting rid of it before it becomes stale. The one center problem to solve in house-drainage is, how to get clear of fresh sewage through pure, clean pipes.

All matter that is to be carried by the house sewer system, having thus been introduced into it, in quantity, quality and method, as is best, the next question is as to the construction and relations of the pipes which are to carry it. Were it not for frequent errors, it would go without the saying that these pipes must be of such make and joining as will most completely conduct all that goes into them out from the house. This means that there must not be such roughness of surface, such smallness of calibre, such sharp points or quick turns, or angles,

as would either leak foul air, catch particles, or interrupt swiftness of flow; that they must be of such metal, and of such uniform thickness, as to allow no leakage of any gas, and that they must have proper fall.

Experiments now tell us just what these proportions are, and proper skill can construct and join tubes precisely in accord with these requirements. The next principle is to adapt the size and shape to the stream to be carried, so that, by this proportion between quantity and calibre, the current shall aid the fall to give such flow as shall be sufficiently rapid and self-cleansing. We must provide enough calibre of pipe to prevent clogging, yet not so much or so confined a space or chamber in the unfilled part of the pipe as shall be a receptacle for foul or stagnant air. It is to accomplish this that now smaller pipes are advocated than formerly, and that they are often made of the shape of the small end of an egg at the bottom so that the stream is made deeper and more compact, and thus a greater current is secured. The perfect pipe would need to be so smooth as to have no obstruction and the least amount of friction of surface, and to flow just full all the time, light and air having free access to the surface of the flowing sewage. But as, for many reasons, this is not always feasible, we must make the nearest approach we can by adjusting the shape of the pipe to the varying current, by making the whole pipe no larger than is really necessary. Next we must so construct the pipes as to admit currents of air, and give air-flow and flushing at such points as will not let out any of the flowing liquid, but as will let in good air and let out any possible foul air, at places convenient and not hazardous. And one great value of such a system is that there is very little, if any, hurtful air to let out.

The idea is, first, to have all material passing through to be the fresh soiled water before it is disease-breeding; second, to utilize the water, not only as a carrier to take it out of the way, but so as, by its own air, its own running action and its ability to suck up air along its surfaces, to secure oxidation or change of organic matter, whether in suspension or solution; and third, so to allow the free play of air through the pipes, as that it may both furnish this supply and do its own direct work in this same process of oxidization and healthy decomposition. When sewage is managed and conduits arranged on these principles, with the exception of the often unavoidable absence of light, we get the benefit of those chief principles upon which the safe conveyance of sewage must depend. As the soiled liquid runs along the pipe, the shape, size and velocity of the stream aid as a flush, while, at the same time, the

movement helps to appropriate the air that is available, to secure oxidation and other changes of the floating particles. If, by a flush-tank or other means, the liquid is made to flow in gushes instead of a small stream or in driblets, there is more flush and more suction of air.

Besides the presence of pure air, it is desirable that it be so introduced as that it may circulate. Indeed, without this it cannot maintain an average of comparative purity. It is better still if some rapidity of circulation can be secured, and, at times, the air be made to flow rapidly through the pipes. Very often, with a view to this, an opening is made by extending the soil-pipe to the roof, open at the top. But, *as it takes an opening somewhere below, as well as above, to make a current*, it must be remembered that this one opening, while better than none, is not enough. Again, the opening or openings are often made too small, and, although serving as *vents*, or to prevent pressure of gas and syphonage, they do not serve as real ventilators, or air and wind circulators. Hence, it is now a rule in the best constructed systems of house-sewage delivery, to have the main soil-pipe of the house run out open through the roof; and, *also*, just as it leaves the building to join the cesspool or sewer, to have another opening or outer stand-pipe connecting with it, and nearly as large in its diameter, which shall let in or out the air, and thus secure free circulation through the house soil-pipe system. With the main soil-pipe thus running through the house, *having an opening at each end for air, and no intervening trap*, we have facility for the entrance and exit of outside air. The temperature of the air outside and inside is generally different, and somewhat different at different points of the pipe in the building, and thus circulation is maintained. There are some physical laws as to the motion of air in pipes, as to the influence of heat, of friction, of currents and counter-currents, that may still admit of more accurate adjustment. But as a fact of actual test, it is found that soil-pipes thus constructed, as a rule, secure for themselves a circulation that purifies the air of the flowing sewage. The pipe that ends above the roof should be high enough not to be covered by snow, should have in it a wire ball to prevent leaves getting in, and, if having a hood at all, should have it so high as not to interfere with free circulation. As to the opening in the soil-pipe, at its lower end, where the soil-pipe emerges from the building, most prefer to carry a pipe or leader from it up to the roof, although many claim that house-pipes thus aired and cared for cannot produce spoiled air, and so may be allowed to end near the ground. Where the house is very large,

and the pipe system has many connections, it is best to have more than one roof opening. It will be perceived that such a system excludes all traps from the main inside soil-pipe, as these would interfere with the circulation of air.

TRAPS.

But if we are thus to leave the soil-pipe or main house-sewer without any traps, where, within the building, will you have traps? Now and then a good authority says, "nowhere." Such say that a well-managed system of this kind will be kept so pure that there can be no foul air to come into the house or to be produced in it, and that additional free circulation is had through the connecting pipes by having no traps under wash-basins, closets, sinks, bath-tubs, etc. Most authorities, however, say that, for fear of some such air, it is best to have the usual water-seal or trap under the basins, closets, etc., quite near to them and before their own short pipes join the main soil-pipe; also, *to have, just beyond the bottom outside opening of the main soil-pipe,* a trap beween it and the cesspool or sewer, so as to have a good guard against any foul air from these. A perfect system of sewer or cesspool will also have ventilation of its own for itself and its pipes. Thus, just as the house has its soil-pipe ventilated by two openings, with a cut-off trap between it and the sewer or cesspool, the sewer or cesspool should have its opening with the same trap serving as a cut-off from the house system. Thus the attempt is to keep each pure and so far independent of the other as that the condition of the one shall not contaminate the other. But as you may not be able to control the outside system, have, at least, the inside system well ventilated and separated by the exit trap. If the reader will get clearly in mind the principles of house arrangement thus laid down and explained, he will be able to estimate what methods should be adopted. Many connect the water-leaders of the roof with the house system, and use these as aids to the ventilation. This does no harm, unless it is unwise to let so much water go into the cesspool or sewer, or unless the rush of water may sometimes be so great through them as to syphon; *i. e.,* discharge the water from traps, and thus render the house, for the time, open to sewer air, if there is any; also, where roof-leaders connect directly with a sewer, while they help to ventilate it, if any side-leaders enter from piazzas or lower points, these may make open conduits for foul air too near

windows. But in such a system there ought to be no foul air. We thus hope to have made plain the most that relates to the general system of house delivery of liquid sewage.

It is often asked under what circumstances a trap may have the water forced out of it and cease to be a trap. In other words, *how is the risk of syphonage to be avoided?* When the pressure of air is removed from a trap so that the water is forced out of it, it is said to be syphoned. The water being removed, the trap is unsealed. This may happen under two sets of circumstances: First—Water flowing into the same pipe from fixtures above it, by the momentum of the stream and the air draft it makes in connection with the column below the trap, may remove the air pressure, and unless some water follows it more slowly, leave the trap empty. In this case, the weight of the column of water so removes pressure as to take the water from the seal, the air draft aiding in the effect. Where the distance is short or the trap is so as not to receive the full weight of water, it is not likely to occur. Second—These side traps of connecting pipes may be syphoned by the full and rapid flow of water through the main or soil-pipe with which they are connected. The air between the soil-pipe and the side trap is thus sucked out, and, as a consequence, the water in the trap follows it. A dash of water through a soil-pipe is not likely to syphon such traps unless they are very near, the pipes and the traps small and the soil-pipe is running full.

It must be admitted that practically there are found to be many variations of effect according to the whirl or direction of the water, the fall, the temperature of pipes, etc., so that there is much difference of opinion as to the liability of syphonage. This is one of the reasons why more dependence should be placed on flushing with water and air, and having pipes in all respects right, and the air pure, than on the trap alone. It is usual now in the best arranged systems to provide against the possibility of syphonage, by having a small vent-pipe pass from the "crown" or top of the trap nearest the outlet up or out to the air. Thus either air is let in so as to prevent syphonage, or if the water is carried out of the trap by the force of a descending stream in the pipe, enough water runs up the vent to fall back into the trap and continue the seal after the stream has rushed by. As to the size of this vent, "it is not safe to trust to a vent-pipe of less size than that of the trap it is to serve, until we get above two inches diameter, except it be of only a few feet in length" before reaching the outer air or joining a larger vent.

While we believe the risk of syphoning traps where the soil-pipe is ventilated on the roof and at its exit from the house, is often magnified, those who construct house sewage systems should fully understand the possibilities and the modes of protection. If the traps are near the basins or closets and are shaped and set so as to have from one and a half to two inches actual seal, and the soil-pipe is so ample as never to flow entirely full, syphonage is not likely to occur. Where, as from a bath-tub, there has been a full, sudden rush of water, it is well to allow a half-cupful to run down just as the flow is ceasing. It is claimed that some traps, like the Bower or Cordell, are not as easily syphoned as the *S* trap, which in general is in approved use. Some now claim that it is better to have the trap so near the basin that one can look down into it and see whether the water is in it.

In houses already constructed it is often not feasible to introduce a vent system of pipes for all traps. In these the round or bottle-trap (unpatented) can be safely used, except that it is to be remembered that by its shape it gives too much room for the settling of filthy particles, and should be accessible for cleansing.

There is but little danger of syphoning the trap of the outlet-pipe as it goes toward the cesspool or sewer, if it is of good size and has the outside ventilating-pipe before referred to. While questions as to the possible syphonage of traps must generally be submitted to authorities, with all the actual facts of size, locality, etc., given, these directions will aid those who wish to know when to seek for special advice. We claim that notwithstanding the number of defective house systems, it is now possible to build healthy houses with all the modern improvements. But it is to be remembered that this is skilled work, that there is sometimes need of cleansing of such apparatus, as well as house-cleaning in other particulars, and that an annual inspection of all plumbing work is desirable. Because it is thus possible, it is not, however, best to have pipes ending in each room, but to locate the bath-room, basins, etc, in one well-aired, accessible room, well located for light and ventilation.

DISINFECTION.

We have already, in former reports, said so much on this subject (see Third Report, pages 68–83; Fourth Report, pages 260–265,) that but little needs to be added here. Where any odor is perceived from a closet or other appliance, sulphate of iron, (that is, copperas or green

vitriol,) dissolved in water in the proportion of two pounds to a gallon, is most available to be thrown down the receptacle just after the rush of water, and so that some of it may remain in the trap. Various other articles, named in former reports, may be used in the same way. Borax is a good material with which to scrub out all fixtures. All places that are accessible to soap and the scrub brush should receive the occasional use of the same, since even air and flushing does not always remove or neutralize each organic particle. All those water-closets known as plungers, or which have a handle to raise, should occasionally have the top unscrewed and the side chamber thoroughly cleansed.

HOW TO TEST THE HOUSE SYSTEM OF SEWERAGE.

Various methods have been devised, but the water test, the peppermint test and the smoke test are the most prominent.

The water test is founded on the very proper assumption, that if the outflow is stopped by a valve or other device, and the pipe filled with water, it will continue to stand at its first level unless there is a leakage somewhere. The difficulty in applying this test is that it is not always easy to plug up the outlet, and that the level of the water rising in connecting pipes is not always situated so as to be convenient of inspection. Yet there is no reason why, occasionally, or because of suspicion, the fixtures may not be so loosened or put aside as to expose all connecting pipes above their trap, and the outside pipe be plugged just before it comes to the outside ventilator and trap. Then the highest horizontal pipe being kept for observation, the whole pipe system, when filled, should preserve its level. This, if showing leakage, unfortunately does not show locality, unless each series of pipes is tried separately. Where the traps have vent-pipes these also complicate the trial. It is, therefore, chiefly applicable to some main or continuous pipe that needs testing. It is exceedingly desirable that, as far as possible, all house soil-pipes should be out of the wall and exposed, as thus any leakages can be detected.

The two commonest tests are those known as the *peppermint test* and the *smoke test.*

"The smell of peppermint is well known, but probably its excessive pungency when in the form of the oil, and when brought into contact with hot water, is not generally understood.

"If such an excessively pungent mixture as this be introduced into

the drainage system of a house, even the smallest leakage will become evident. Suppose the least possible defect to exist in any joint of any of the pipes, a strong smell of peppermint will be evident near the defect. The only difficulty is finding a place to introduce the peppermint. It will be quite evident that it is no use to pour it into any of the appliances in the house, as, were such done, this smell would so rapidly permeate the whole of the premises, by way of the staircase, passages, etc., that time would not be allowed to detect the leakages. Some means must be discovered of getting the peppermint in from the outside. This is not always possible, but generally it is. In the case illustrated there would be no difficulty. The rain-water pipe at the back admirably suits the purpose. One person gets out on the flat roof, near the top of the pipe, and provides himself with peppermint and four or five gallons of water, as near boiling as possible. Meantime, all doors and windows are closely shut, and persons are stationed about the house to observe if the smell expected becomes evident, and to locate, as far as possible, the point from which it issues. The man on the roof pours about half an ounce of the oil down the pipe, and follows it with the hot water. He need then retreat from the place a little, for the peppermint-laden steam which will come from the pipe is blinding in its pungency. As soon as possible he plugs up the top of the pipe with a towel, or some such thing, to prevent the occurrence of the vacuum which would otherwise be in the pipes, and which would tend to draw air from the house into the pipes instead of from the pipes into the house, at any leakage. It would probably not be a minute before the people in the house would perceive the smell at various places. The manipulator of the peppermint must remain perched on the roof until those inside have had time to make their observations, otherwise he will infallibly bring the smell with him."

The test described is an excellent one. It is searching and is simple in application, but it has one drawback. It is impossible by means of it exactly to localize a leakage. This drawback does not apply to the smoke test, as made by a smoke machine. This is nothing more nor less than a centrifugal pump attached to a vessel for generating smoke. The pump pumps smoke out by a pipe, which may be inserted in any pipe in direct communication with the drain, or in an aperture made for the purpose.

The test is in all respects similar to the peppermint one, excepting

that the leakage is not smelt, but seen, and, as we all know, seeing is believing.

After the test has been performed the drain may be opened. This may be done by breaking into a pipe in front, by breaking off a collar, or by punching a round hole in the pipe. In any case it will be possible to judge much of the condition of the drain by the manner in which water runs through the pipes. If we have discovered that there is sufficient total fall, we can now see whether or not it is uniform. We shall find in a few cases out of every hundred examined that there is a total stoppage, that no sewage whatever leaves the premises, and that consequently it must all be depositing under the basement.

If the drain, after all tests so far applied, and from what can be seen of it, appear to be in good condition, it may be further tested by filling, or attempting to fill, it with water. There is probably not an average of one drain in a hundred in old houses which would remain full of water for an hour. For the rest it is necessary to examine all appliances, to trace the pipes from them, and sometimes to test these pipes.

OUTSIDE DISPOSITION OF LIQUID REFUSE.

We have thus far considered the relations of buildings to the modes for the delivery of liquid household refuse up to the point of their leaving the house through conduits or soil-pipes, separated from the outside system by a good trap or water-seal, with a ventilating opening or pipe from this house sewer on the house side of the trap. Thus you have devices by which whatever may be the condition of outside sewers, cesspools or places of deposit, it is hoped that there will be no pipes leading the foul air into the house.

Yet it is to be borne in mind that the most radical and defensible method is to have no foul air kept or generated outside which can be brought into the house.

It is also to be remembered that independent of pipes, if the cesspool or the ground near the house is being contaminated, air direct from there finds its way into the house, mingling with the general air, and thus furnishes devitalized and devitalizing breathing material. Also, if there is a well or ground cistern on the premises, the water may be contaminated through this air, or through more direct contamination in the ground itself.

If all the liquid material is carried directly to a sewer by a ventilated

and smooth and fairly self-cleansing pipe, with proper fall, the problem is simplified so far as the individual house is concerned. It is insisted that all pipes under the building be of iron, and that those between the building and sewer be of the best vitrified pipe, so laid and so joined as to make them absolutely water-tight. If one can have full security that such pipes shall be of best quality and construction, and shall be properly laid, they are as durable as iron pipes, which, notwithstanding coating, become roughened and rusted, and are then less lasting than the best stoneware or vitrified fire-clay pipe.

Too often the iron pipe, where it comes out of the building and is joined to the vitrified or stoneware-pipe, *is not well joined.* It should not depend upon cement, but have caulking with tarred gasket, so as to fit the socket tightly. The plan adopted by Engineer Philbrick in laying the pipe for Princeton College, so well expresses the kind of work desirable for all outside soil or sewer-pipes, that we quote his outline:

"SPECIFICATIONS FOR LAYING STONE-WARE DRAINS.

"MATERIALS.—No pipes should be used which are not nearly cylindrical, a variation of over one-fourth of an inch in the different diameters of a 6-inch pipe being enough to condemn it.

"The pipe should not have bells or hubs attached, as is now generally done, but should be formed in simple cylinders, the joints being covered by loose rings or collars of the same material, without glazing, to be broken in three or more pieces when applied.

"The thickness should be uniform and not less than $\frac{5}{8}$ and $\frac{3}{4}$-inch for 5-inch and 6-inch pipe, respectively.

"The glazing should be '*salt glazing*,' and not '*slip*' or *clay* glazing, and should extend throughout the whole interior, but should be omitted on the collars and on the outside of pipes for $1\frac{1}{2}$ inches at either end of the pieces. If the ends are glazed outside, the cement used at the joints does not adhere well, and the joint may be leaky, even with good cement and put together with the best of care.

"The clay of which they are made should, of course, be of good quality and well burned. Less trouble, however, is found in practice with the kind of clay than with the results of careless moulding, such as oval, crooked pipes, with glazing applied all over the ends, for no better reason than because it costs some trouble to omit the glazing there, although it is a positive injury.

"The cement should be of any good brand, of fair hydraulic properties, fine and freshly ground, and carefully mixed with not over its own bulk of *clean, sharp* sand. In all places where the sand is not clean (it should not soil the hands when rubbed between them), it should be washed thoroughly in a bed not over six inches deep with

a copious flow of water, stirring the sand and water quickly with a hoe and allowing all the loam and clay to be carried off, till the water ceases to look muddy. The sand should be then dried and mixed thoroughly with the cement before applying any water. When wetting it for use, no more water should be used than is absolutely necessary to render the mortar plastic.

"It should be wetted only in small quantities for immediate use. All lots left over an interval of half an hour, or long enough to stiffen and begin to 'set,' should be thrown away and not 'tempered up' as is generally done for indiscriminate use. Cement when rewetted after a partial set, is sure to shrink and crack when it hardens, and is worthless for pipe laying.

"The ends of pipes and insides of collars should be wetted in warm weather before applying the mortar to these surfaces. If applied dry, the porous pipe absorbs the water so quickly from the mortar that it never hardens properly, and does not adhere to the pipe.

"WORKMANSHIP.—Pipe should be laid with such good alignment that the inspector can see through every section, like a gun-barrel, from one man-hole or lamp-hole to another, or from house to sewer. This can readily be done with very little extra cost, if pains be taken to pursue proper methods.

"Every piece of pipe should be bedded in cement mortar through its middle portion as well as at its ends, leaving no voids longer than the inside diameter of the pipe between these bearings. The lower half of the pipe should be carefully aligned with its neighbor, by applying a straight edge inside when bedding it, to avoid offsets at the joints, leaving slight inaccuracies in form to be developed at the top of the pipe, which is rarely wetted by the flow.

"Through every piece of pipe as laid should be passed a cord, made fast where starting, and extending through every section of pipe laid, by means of which a wiper or rubber disc between two smaller wooden ones, can be pulled through the whole section before leaving it for a night. Of course the mason is expected to see that every joint is clean as laid, but human nature is fallible and can't be trusted to remember this, the consequences of such neglect being often a total failure of the drain.

"Every section should be covered about three inches with fine earth, and tested by some two or three feet of water pressure, when the defects will be seen and may be remedied before filling the trench. The best masons will be astonished to see how many leaky joints they make unawares, and which may never be detected in any way but this.

"The back filling should be applied with care, packing the material around the pipes without moving them on their beds even a hair's-breadth. The trench may be puddled with water if it is at hand, taking care not to wash the cement when applying it.

"No good drain can be laid on a yielding foundation. No matter

what the material may be, it will break and make leaks when settlement occurs, for though the drain itself is light, the material over it is heavy and crowds it down as it settles. All drains on newly-filled land should be treated as temporary works to be replaced when the settlement is finished.

"After many years of experimenting, I have arrived at the conclusion that all stone-ware pipes should be laid by none but first-class workmen, and even then the work should be tested by slight hydraulic pressure before it is buried deeply, so that defective joints can be readily seen and made good before filling up the trench."

There might be slight variations of preference among different constructors, but these are the guiding principles. And it needs to be borne in mind that ordinary masons or builders do not conform to these plans, but assume that the work is to be done much after the manner of ordinary brick-laying. Just as an architect is employed to superintend a building and see to the fulfillment of the specifications of a contract, it is desirable that some one who has made sanitary art a study, should superintend such work; all the more, because so much of it is to be buried out of sight, where defects cannot be seen, and are often discovered only because sickness and death have openly manifested them. All *pipes and all sewers that are intended to convey foul* liquids must be water-tight, or hermetically sealed, except at points of ingress and egress, where intentional openings are made for ventilation.

A house-pipe should enter a sewer as far above the general level of its flow as the fall will permit, and in the direction of the sewer-flow. In order to prevent a back flow in the pipes, they should also enter a cesspool not far from the top. If, as there should be, there is a trap in the course of the pipe leading from the house just near its exit, there should not be another trap as the pipe enters the sewer or cesspool, since this would make a space of confined and unventilated foul air between the traps.

Should *the sewer or cesspool* be ventilated? The principle that we have advocated for all house soil-pipes applies exactly to all sewers and cesspools and their pipes. The sewer should have its ventilators generally not over 300 feet apart, and regulated as to size, frequency and locality by various considerations. Sometimes they may, especially at the beginning and the end, be carried up by the sides of trees or houses. Details cannot be fully given without knowing all particulars, but with these the principles of ventilation are generally easily carried out.

Where a cesspool is used, the ventilation is more directly under the control of the owner. From the first frost of fall to the last frost of spring, almost any ventilation that does not admit increase of liquid by rains, etc., will suffice.

A system of ventilation which is all-sufficient is made by having four pipes of not less than four-inch calibre running on a curve out near the top of the cesspool to a little above the ground, where each may have either a wire ball or movable cover. These serve to pass the upper air through the empty part of the cesspool, and so secure the dilution or change of any gas that may arise. These may enter the cesspool at varying and convenient points below the top, but all of them a little higher than the pipe by which the liquids from the house enter. The cesspool should not be so covered over with soil as not to admit of examination as to the height of its contents.

Where two or more successive cesspools are built, the one to receive the overflow of the other, the connecting tube is sometimes so arranged as to help the ventilation of both by having ventilating holes along its course. Because of imperfections it is generally safe to have all ventilators end by a tube up into the air.

Under what circumstances may cesspools be used? The reply of some of the very best authorities is, never. Such assert the principle that it is never wise to store filth, and therefore it should never be done. To this a reply is, that, with all the proper conditions given and specified, it is possible and feasible to store these liquids safely for a time. The answer to this again is, that the practical difficulty of securing the carrying out of such conditions is such that, in ninety-nine cases out of a hundred, absolute safety is not secured. This is too true, but does not vacate the propriety of stating what these conditions are. In order to arrive at these, we must state how cesspools are to be built, if at all, what are the risks, and what the best protection from these. The first question that arises is, shall the cesspool be so built as to allow part of its liquids to leak out at the bottom and sides, so as to leave only the undissolved matters, and so as not to need frequent emptying; or, shall it be built tight, like a cistern, and to be cleaned out as it becomes full?

If a spot can be found at least 100 feet away from your own or your neighbor's well and from the house, if the water level of the ground is low, so that it has much air in it and can receive the liquid slop as it leaks out of the cesspool, and if the soil is a gravel and

sand or a light, clayey loam, admitting of good percolation or soakage and cultivation, it is possible to have such a cesspool.

It should be made of even surface, should not go down deeper than the usual water level, and should be large enough never to be filled within a foot of the top. It should be well covered, so as to protect it from solar heat, yet by a stone cover should admit of inspection, and should be cleansed in early spring of all its contents. Three or four pipes of tile, coming out from about eight inches below the surface and opening on the surface, will ventilate it better than only one. Some, during the summer, would hang a wire netting of powdered charcoal just under the cover, but this is not generally necessary. Where there is need of a curb or lining, bricks loosely laid are best, and the cover should be an arch or stone. Occasionally such cesspools are well kept, and with no reason to suspect evil consequences therefrom. It is only because of nearness to water-supply or house, of neglects and of close vicinage, as in cities, that they are to be condemned. It is because the necessary accumulation of these in cities vacates the conditions of dry, well-aired soil, admitting of percolation and proper disposal, that they are ill adapted for city use. It is because they are so often made in a silly way, and so often neglected in the country, that they too often become disease-breeding nuisances.

It should be a rule not to make them very deep. Ground within four or five feet of the surface deals with refuse far better than earth deeper down. The air more readily reaches it, the growing vegetation appropriates it, and so it comes more within the reach of the conservative processes of nature. If tile-pipes a few inches from the surface run out in every direction, so much the better. The only exception to preference for superficial cesspools is where, by going deeper, you penetrate a clay bed, and strike a gravel or sand bed which is more porous and so removes it, unless, at the same time, you strike the water level.

While cautioning against the use of such cesspools, we desire that when used they shall be of the best kind and properly kept and cleansed.

Because of the possibility of a filth soakage which might contaminate the ground, or the water, or the air, where cesspools must be used, it is more usual to advocate those built after the manner of a cistern, thoroughly and smoothly cemented on the bottom and sides, and so provided as tight receptacles, to be emptied when full. The rules given as to the connecting pipes and ventilation, are the same in

regard to these as to the uncemented cesspools. But as no demand is to be made on the soil or ground, the locality, depth, etc., may be to suit the owner.

These tight cesspools always need to be watched, so that they shall not be allowed to overflow. It is better also, if possible, that they be not emptied by small and continuous pumping which agitates the mass, but by some form of odorless excavating apparatus, which quickly removes contents and admits of more thorough cleansing and disinfection. Some of the foulest arrangements to be met are closed cesspools, often made of planks driven down, which, from day to day, are being emptied by common pumps of their decomposed and putrescent liquids. Where cesspools are used, they should be made sufficiently large only to require emptying in the early spring and fall. Such cesspools should have at least two stand pipes for ventilation, of unequal heights, and of not less than four inches diameter.

Non-ventilated cesspools have given name to two forms of disease in Paris: the one a form of asphyxia, caused by sulphuretted hydrogen; and the other an inflammation of the eyes, caused by the ammonia in the foul air.

Where there are no public sewers, and owners of property are unwilling to have cesspools, two other forms of disposal have been successfully tried, each depending on soil disposal. One process of preparation is as follows: The small plot of land adjacent to the house is first thoroughly underdrained, so as to secure for it the lowest possible water level and the quick subsidence of all rains from its surface. This is done by close, deep laying of drain tiles in the usual form. These should generally be laid a little time before others now to be described, since thus the ground is allowed to become fully settled. Surface-water is kept off of it as much as possible. Next, another series or system of tiles is laid in a way quite similar, but of less size, nearer to the surface, and for a different purpose. The design of this system of pipes is that they shall be as near the surface as frost and surface-flowing or spading will allow, so that the liquid slops can flow through them and soak into the drained soil, and be appropriated by well-cultivated grains, grasses and croppage upon the surface. It is surprising, if these two ideas are well carried out, how much of the liquid and its organic particles can be thus disposed of. But there is one other condition: This slop must not come dribbling along the pipes just where it will, but must be received into a little tight cistern, called a "flush tank," so arranged as that it will, when about full,

each day, send out its contents with a gush through these pipes, and thus leave them a part of the time dry or vacant for the circulation of the air. It is easily arranged that this tank shall, at a certain height of the liquid, discharge itself, and also that it may discharge one day into a certain portion of the pipes and another day into another portion. It is found that thus a far greater quantity will be appropriated and nuisance from it prevented. Even the more solid matters, except such very coarse portions as are detained by a cleansing wire, become macerated, and afterward dried out and taken up from the small pipes by the growing plants. In Orange, in Princeton, and many other places, this plan can be found in successful operation. Most of the pipes do not need to be over two inches in calibre, and should not be more than from eight to twelve inches beneath the surface. While the persons putting down and overseeing such a system must understand not only its construction, but the necessary relative conditions as to soil and high culture, and closeness of plant or putting down, it is a feasible and satisfactory plan when well devised and superintended.

The next plan is that of modified *surface irrigation*. It, like the former, is based upon the idea of "intermittent filtration of soiled liquids" through the ground. By its structure, its air, its croppage, and its *alternation* of supply, the earth or soil can appropriate much floating or liquid material.

In this method, there should be under-drainage as before, but instead of the second series of pipes, reliance is had upon surface methods. Series of superficial trenches or furrows are made lengthwise, which run up to a long furrow parallel with the rear of the house and made to receive the liquid outflow. This can, if preferred, be made of galvanized iron, with movable outlets opposite each furrow, so that the contents can sometimes flow out some of these furrows, and sometimes at others. If so it should be cleansed occasionally with some one of the liquid disinfectants named in our circular. As the liquid is not intended to overflow, these furrows can be kept covered with boards if preferred. Here the liquid slop of each day is received into this long gutter, as in the former instance it was into the "flush tank." But now it is allowed to flow out by surface instead of sub-soil methods. When this is well managed, a small piece of ground with heavy grass, or with Indian corn cultivated as for fodder, or with vegetables, will dispose of very much soiled liquid. It is not found offensive, as is apt to be imagined, and is at least applicable to many country houses. The furrows can be changed from

year to year, and if the ground is thoroughly worked and aided with lime or other inorganic fertilizers, it thus disposes of the refuse. Without indicating preferences, which must often be relative, and must depend on the facilities and on the exactness of administration, we thus plainly indicate the most common and available means for dealing with the soiled liquid sewage of the household.

MODES AND PLACES OF INTERMENT.

BY DAVID WARMAN, M.D., TRENTON.

The disposal of the dead is none the less a sanitary question than the care of the living. Disease and pestilence are recognized evils. Whatever contributes to produce them must, if possible, be removed. We know that pestilential influences arise from various causes, and we provide against them. Much has been written upon the subject of contamination of the air from sewer gases and pollution of the soil and water by cesspools, and kindred topics, but a comparatively limited amount of attention has been given to the interment of the dead. It seems, therefore, imperative that a knowledge of the modes of burial, and the dangers that may arise from the improper disposal of the remains of our beloved dead, should become more extended. The experience of the past shows the importance of the careful consideration of this subject. The welfare of the living must not be lost sight of, while all proper respect is shown to the dead. The question of how and where the dead shall be disposed of, is one that is eminently sanitary. The dead should be so buried that the living may not suffer.

The disposal of the dead has varied at times, simply from fear of desecration of the grave. In the time of the resurrectionists, many bodies were buried in quicklime, and a resident of Dundee was so fearful lest the coffin of his child should be disturbed that he arranged an explosive apparatus, which was buried with the coffin. The methods in modern use are, as every one knows, first, intramural and extramural; second, cremation. The latter method is the burning of the dead.

This very ancient method of disposing of the dead has in modern times been, to a certain extent, revived. In England a society has been formed to introduce the practice, and in Germany cremation

has also made some progress. It has also been used to a limited extent in the United States. The serious and almost insuperable objection is the facility with which cremation would conceal certain crimes, such as poisoning, and render identity in other cases impossible. Cremation has not been accepted in this country, and there is nothing to deplore in the fact. It can doubtless be a useful mode of disposing of the dead in many cases, yet we do not think that either sanitation or sentiment demand it; and in many parts of the country it will be a long time before it can be made practicable or economical.

The other method, of intramural and extramural interment, or the enclosing of the dead in a grave, either within cities or beyond their confines, is generally adopted by all civilized races.

There are few countries where more excellent regulations relating to burial grounds and the interment of the dead exist, where the ceremony of burial is conducted with more propriety, and where greater respect is paid to the deceased, than in our own land, yet in some particulars improvement might and ought to be made.

The history and condition of burial grounds and the regulations for the interment of the dead, are intimately connected with the public health and should form a part of the sanitary regulations of every city and town. We can in this connection notice only some general matters which the subject suggests.

There are two principal objects which should be kept in mind, in these regulations: first, to pay proper respect to the dead, and, second, to protect the health of the living. To accomplish this there are several matters to be considered. The first important lesson for us to learn is, *that the dead and living were never intended to be brought in close proximity.*

That interment or enclosing the dead in a grave is a most ancient custom there cannot be a doubt. Amongst the ancient Jews, to have no burial was reckoned among the greatest of calamities. The exposure in any manner of their dead (even criminals) was looked upon as a pollution of their land. The Egyptians and Asiatics practiced interment from the beginning of time. Subsequently it became the custom to burn the bodies of the dead. By Homer's description of the funeral of Patroclus, it would appear that the Greeks used burning as early as the Trojan war. They also had recourse to interment, as seen by their historians, who give an account of the manner in which bodies were placed in the grave; Plutarch tells us they were laid with their faces toward the east or towards the

west; and Cicero informs us that, in early times, as those of Cecrops, interment was altogether made as by the Greeks; but we have ample testimony, in history, that it always took place without their cities, particularly among the Jews and Greeks, from whom the Romans derived the custom. We have several passages in the New Testament showing that the Jews buried their dead without the city. Servius, in giving an account of the unhappy death of his colleague, Marcellus, which happened in Greece, says that he could not, by any means, obtain leave of the Athenians to allow him a burial-place within the city.

The Romans observed the same custom from the first building of their city; it afterwards became a law, as settled by the Decemviri, "Neither burn, or bury within the city." They generally buried near the highways—in fields appropriated for the purpose. Their reasons seem to have been founded on sacred as well as civil considerations; among the former, that the passers-by might see the graves and be reminded of their own mortality—hence, as Varro tells us, the inscription upon the monuments, "Sta. Viator;" among the latter, "that the air might not be corrupted by the stench of putrefying bodies." The ancient Persians never buried in cities or towns. Their kings were interred on a high hill, on the east of Persipolis; generally, throughout Persia and the Levant, there were no burial-places except those without the city. The cemeteries of the Turks were always without the town, that the air might not be corrupted by the vapors arising from the graves; they, in like manner as the Romans, also bury by the sides of the highways, that travelers may be reminded to pray to God for the deceased. Eusebius informs us that when the Christians, by favor of Constantine, built churches in the cities, they had their burial-places outside. According to Gregory of Tours, it was not until the latter part of the sixth century (about A. D. 590) that funeral places and cemeteries within the towns were consecrated or tolerated. Hesperian informs us that the ancients greatly disapproved the innovation of burying in towns and churches; and, on that account, the councils of their bishops made several canons and decrees against intramural and church burial.

Whether the ancients burned or interred their dead, they never made choice of the place of divine worship, either to bury the dead or deposit the ashes. For centuries after Christianity was established, they never presumed to make God's temple the charnel of the dead.

On the contrary, when the ancient mode of burial without the city began to be neglected, burials in the churches were approved by authority.

The being buried in or near a church, we are told, originated with the first Christian Emperor, Constantine, who, although he did not desire to be buried within the church (a thing in his day unheard of), was resolved that his remains should be deposited as near as possible to it; they were accordingly interred in the porch of the great church at Constantinople. Subsequently the practice increased and persons of quality claimed a similar privilege. Their inferiors, although they claimed not the right of being buried within the porches, deemed it an honor to be buried as near thereto as possible; hence another reason assigned for large courts and yards around churches.

Intramural burials and church-yards, it would seem, originated in the idea that persons passing the graves of their dead relatives or friends, on their way to worship, might be reminded to offer up prayers for them.

> "The melancholy ghosts of dead renown,
> With penitential aspect as they passed,
> All point at earth and smile at human pride."

With reference to burying in churches, the custom did not arise earlier than the year 1076. In the reign of William the Conqueror, the Council held at Winchester, under Laufranc, Archbishop of Canterbury, by the ninth canon, opposed burial in churches. It soon after, however, became a custom, and vaults were built under the altars.

"It is horrid," said the Austrian Emperor, "that a place of worship, a temple of the Supreme Being, should be converted into a pest-house for living creatures."

The following extract is from a sermon preached by Bishop Lattimer, in 1552, which proves that even at that early period, when the population of London could scarcely have been one-sixth of what it is now, the nuisance of intramural interments was found to be dangerous to health, if near a church or the houses of the living. "The citizens of Nain," observed the Bishop, "hadd their buryinge-place withoute the citie, which no doubt is a laudable thinge, and I doe marvel that London being soe great a citie, hath not a burial-place without; for no doubt it is an unwholesome thinge to bury within the citie, especialle at such a time when there be great sicknesses and manie

die together. I think, verilie, that many taketh his death in St. Paul's church-yard, and this I speak of experience, for I myself, when I have been there some mornings to heare the sermons, have felt such an ill-favored and unwholesome savour, that I was the worse for it a while after, and I think no lesse but it is the occasion of great sicknesses and disease."

Well would it have been for the inhabitants of this vast metropolis, had Sir Christopher Wren's plan been carried out at the rebuilding of the city after the fire of 1666. All grave-yards, according to his recommendation, were to have been removed without the town.

In the year 1786, the Legislature of Germany passed a law, which was punctually obeyed in the empire over which Joseph II. ruled, and which we would do well to imitate, instead of using the ground around and about our churches and chapels as store and pest-houses. This law prohibited the burying of dead bodies in or around any church or chapel whatever. Neither rank nor affluence could obtain permission to evade it, as in the enforcement of it no respect was paid to persons.

Dr. Adam Clarke, in his commentary on St. Luke, advises that "no burying-places should be tolerated within cities or towns; much less in or about churches or chapels. This custom is excessively injurious to the inhabitants, and especially to those who frequent public worship in such chapels and churches. God, decency and health, forbid this shocking abomination. * * * From long observation I can attest that churches and chapels situated in grave-yards, and those especially within whose walls the dead are interred, are perfectly unwholesome; and many by attending such places are shortening their passage to the house appointed for all living. What increases the iniquity of this abominable and deadly work, is that the burying-grounds attached to many churches and chapels are made a source of private gain. The whole of this preposterous conduct is as indecorous and unhealthy as it is profane. Every man should know that the gas that is disengaged from putrid flesh, and particularly from a human body, is not only unfriendly to, but destructive of, animal life. Superstition first introduced a practice which self-interest and covetousness continue to maintain."

As examples of evils arising from this custom, I quote the following cases:

The Rev. Dr. Reuder, in his tour through Germany, published in London in the year 1810, mentions the case of a very corpulent lady who died. Before her death she begged, as a particular favor, to be

buried in the parochial church. She died on Wednesday, and on the following Saturday was buried according to her desire. The day following the clergyman preached her funeral sermon. The succeeding Sunday, being the day for administering the holy sacrament, about 900 persons were present. The weather was very hot. Many during the service were obliged to go out for a time to avoid fainting, while some actually fainted away. A quarter of an hour after the ceremony, before they had quitted the church, more than sixty of them were taken ill. Several died in the most severe agonies; others of a more vigorous constitution survived by the help of medical assistance. A most violent consternation prevailed about the whole congregation and town. It was concluded that the wine had been poisoned, and so it was generally believed. The sacristan and several others belonging to the vestry were arrested and cast into prison. The persons accused underwent very great hardships. During the space of a week they were confined in a dungeon, and some of them put to the torture, but they persisted in asserting their innocence. On the Sunday following, the magistrate ordered that a chalice of wine, uncovered, should be placed for the space of an hour upon the altar, which time had scarcely elapsed when they beheld the wine filled with myriads of insects, and, by tracing them to their source, it was at length perceived by the rays of the sun that they issued from the grave of the lady who had been buried the preceding fortnight. The people not belonging to the vestry were dismissed, and four men employed to open the grave and the coffin. In doing this, two of them dropped down and expired upon the spot, and the other two were only saved by the utmost exertion of medical talent. It is beyond the power of words to express the horrid sight of the corpse when the coffin was opened. The whole was a mass of entire putrefaction, and it was clearly demonstrated that the numerous insects, both large and small, together with the effluvia which had issued from the body, had caused the pestilential infection which was for a while attributed to poison.

In the autumn of 1843, in Minchinhampton, England, a grave-yard was disturbed which had existed five hundred years. In rebuilding the church it was deemed expedient to lower the surface of the grave-yard to within a foot or two of those buried. The earth so removed, of a dark color, saturated, in fact, with the product of human putrefaction, was in a fatal hour devoted to the purposes of agriculture. About one thousand cart-loads were removed to a new piece of burying-ground to make the grass grow quickly, some as manure in

the neighboring fields, some on the rector's garden, and some in that of the patron. The seeds of disease were thus widely disseminated, and the result was such as any person of common sense might have expected. The diffusion of a morbid poison which soon followed was evinced by an outbreak in this once healthy locality. The family of the rector and the inhabitants of the streets adjoining the church-yard were the first attacked and were also the greatest sufferers. The rector lost his wife, a daughter and his gardener. The patron's gardener, who had been employed in the unseemly art of dressing flower-beds with human manure, also died. The children who attended the school took the fever as they passed the upturned surface of the grave-yard, went home and died, but did not communicate the disease to those who came near them. Seventeen deaths occurred, and upwards of two hundred children had measles, scarlet fever and various kindred eruptions.

In further illustration of this subject, we may cite the instance of the French physicians who were deputed expressly to Egypt by the French government, to investigate the nature of the plague. It is their opinion that the superficial mode of interment that prevails there materially contributes to it. At almost every village they found near the habitations of the Arabs mounds crumbling away and exhibiting the naked bones of those who had been buried in them. In the whole of Lower Egypt corpses are merely thrown on the surface of the earth. A hillock is raised over them, which is quickly demolished, or cracks in drying, while infectious vapors escape through the fissures or flies are admitted to the bodies. The sting of these insects will subsequently produce pestilential tumors of which many of the natives have been known to die.

Carcasses scattered over the field of battle have in all times caused mortal sickness.

We cannot afford space to relate all the accidents that occurred at the beginning of the French revolution. When, on account of the insalubrity of the church and neighborhood of the Cemetery of the Innocents, the government determined to have the remains of the bodies removed, M. Thouret, himself, who was director of the operations, narrowly escaped death from a putrid fever which he contracted in the performance of his duties. The bodies in the burial-ground of St. Eustace, in Paris, were moved in 1780, and of a number of children who were proceeding to the church to be questioned in their catechism, some fell down in a state of syncope, whilst other were subjected to other indis-

positions. Three workmen who had entered the vault died. These and numberless other instances that might be quoted, induced the French government to prohibit interments in or near the town; and it was once in contemplation to burn the dead bodies, according to the custom of ancient Rome.

Vicq. Dazyr says, in regard to these facts: "Were we to collect together all the observations of those who have gone before us, we should find proofs without number of what we advance; the small number of the learned and of persons capable of transmitting to posterity accounts of the deadly effects of interments in churches and in towns, or rather the sanctity with which we ourselves have been used to consider the custom of interring in temples, has been often the reason of attributing to other causes the epidemic diseases which have from time to time depopulated our cities."

Dodsley's Annual Register, July, 1773, gives the particulars of an accident which occurred in a church: "Of one hundred and twenty young persons, of both sexes, who were assembled to receive their first communion, all but six fell dangerously ill, together with the Curé, the grave-diggers and sixty-six other persons. The illness with which they were seized is described as a putrid fever, accompanied with hemorrhagic eruption and inflammation."

All the civilized nations of antiquity have condemned the custom of interment in cities or towns. Wherever he travels, the antiquarian finds in the environs of the great ancient cities *tumuli*, funereal temples, vaults, excavations in caverns, masses of masonry of the most astounding magnitude, such as the pyramids, wonders of the Old World, that appear to have survived the wreck of ages, to teach us an important lesson—a lesson, however, as yet unattended to in many parts of this country.

The examples of the evils arising from intramural interment have thus far been drawn largely from England and the Continent of Europe. The vaults of their churches and crowded church-yards warn us of the danger of this system of burial, that has been handed down to the present century, from the dark period of the middle ages. But it is not necessary to go back to antiquity, or search the pages of ancient history, to establish the fact that the dead and living should not be brought in close proximity, and that, wherever they are, it is always a cause of disease and death. We have had numerous instances in modern times, and in our own country, sufficient to warn us of the

great danger, and of the urgent necessity of making prompt provision to meet them.

The first settlers of the New World came with the traditions of their forefathers. They buried their dead in their midst, and their descendants do so still in very many places. When the population was scattered, and vast territory surrounded the then towns and villages, there was but a minimum of danger; from this fact the people have no doubt become blind to the evils they were fostering in a rapidly-growing country, with large and populous cities and towns building in every direction. Cemeteries extramural have been growing in popular favor in our own country for the last half century. This is an encouraging feature of the times, and illustrates a growing sanitary influence in sharp contrast with the old, offensive, health-polluting grave-yard system. We will cite a few examples of the evils of the old system. Dr. Ackerly thus describes the old grave-yard connected with Trinity Church, New York City, 1822: "During the revolutionary war this ground emitted pestilential vapors, the recollection of which is not obliterated from the memory of a number of living witnesses. In the hard winter of 1780–81 this city was in the possession of the enemy, and the ground was so frozen that the soldiers and others, who were buried there during that long and severe winter, were interred but a small distance beneath the surface. The consequence was, that in the ensuing warm season it became so offensive as to require the interposition of the military commandant, and the Hessian soldiers were employed in covering the ground with a fresh stratum of earth three or four feet thick." In 1814 a battalion of militia was stationed on a lot on Broadway, the rear of which was bounded on Potter's Field (now Washington Square), from which arose a most deadly effluvium. A number of the soldiers were attacked with diarrhœa and fever. They were removed at once. One of the sick died, the others rapidly recovered.

An article in the *Commercial Advertiser*, September 7th, 1822, furnishes further facts: "It will be remembered that the grave-yard being above the streets on the west, and encompassed by a massive stone wall, and the east side being on a level with Broadway, it results that this body of earth, the surface of which has no declivity to carry off the rain, thus becomes a great reservoir of contaminating fluids suspended above the adjacent streets. In proof of this, it is stated that in a house in Thames street springs of water pouring in from that ground occasioned the removal of the tenants, on account of their

exceeding fœtidness. The cellars of all the houses in the streets west of the church-yard were all more or less accessible to impure springs of water." These springs had their source in the grave-yard, which was twenty-five or more feet higher than the last street below it.

There were other grave-yards and vaults in proximity to that of Trinity: the South Reformed Church, having a space of 25,000 square feet in Garden street, which was narrow and confined, and Wall Street Church, covering, with the building, 20,000 square feet, nearly the whole of which was excavated for vaults, and an additional range constructed under the sidewalk. Between Pine and Cedar streets were the burying-grounds of the Associate Reformed and French Protestant Churches. The Middle Dutch Church Cemetery was a considerable place of interment and appropriated to vaults, as also St. Paul's Church and the North Dutch Church in Fulton street. St. Paul's was contiguous to Broadway. The monuments now standing in it bear testimony to its being the resting-place of large numbers of dead. Nearly opposite to it was the grave-yard of the Old Brick Church, which in 1823 was entirely filled. Dr. Pascalis, in commenting upon these, and other burial-places which he makes "of less account," says: "There is, as all know, at the slightest computation, ten acres, or 500,000 square feet of ground, in the church-yards appropriated to graves or vaults. * * * We will take the subject in another point of view, to ascertain whether the space thus employed may endanger the health of the inhabitants. On the authority of observation and experience, it takes more than ten years for the entire decay of the human frame in graves, and a much longer time than that in vaults. * * * The yearly bills of mortality at the City Inspector's office, for the last eleven years, amount to 33,945. We have, then, a total of 33,945 dead bodies dispersed and accumulated within an area of three miles during eleven years and a half, all still under the decomposing operation of nature, and diffusing in the warm season their volatile exhalations in the air we must respire." Dr. Barrow says of them: "They (the grave-yards) are saturated with materials hostile to human life."

In a work published prior to 1823, is the following warning: "Avoid as much as possible being near church-yards. The putrid emanations arising from church-yards are very dangerous, and parish churches, in which many corpses are interred, become impregnated with air so corrupted, especially in the spring, when the ground begins to grow warmer, that it is prudent to avoid this evil, as it may

be, and in some cases has been, one of the chief sources of putrid fevers which are so prevalent at that season." Another writer says: "In the summer of one of the years I have mentioned, the trustees of the church made some repairs to it, and built a porch to each of the eastern doors next to Liberty street. In digging for the foundation of the southeast porch, next to the sugar-house, they came upon the great grave in which had been buried those who died in this sugar-house while it was occupied as a prison during a period of the revolution. The grave was deep and spacious, and it became necessary, in order to get at the solid earth for the foundation of the porch, to disinter a great quantity of the remains of those who had been buried there. Several cart-loads were taken up and carted away. During this operation the air of the church-yard and its vicinity swarmed with myriads of little black flies, very troublesome. They filled our house, covering the sideboard, furniture, and every article on which they could alight. Even closing the doors did not entirely relieve us from the annoyance."

In depositing a corpse in one of the vaults of the Brick Church, Beekman street, the sexton cautioned the attendants "to stand on one side; you are not accustomed to such smells." Mr. De Groadt, the sexton of the Dutch Church above noted, frequently remarked that, in descending into the vaults, "candles lose their lustre; and that the air is so sour and pungent that it stung his nose." The journal says: "This being the case with all the vaults where dead bodies are deposited and subject to be opened at all seasons, this method of disposing of the remains of our friends is, at the least, an unpleasant, and certainly a dangerous one."

The Board of Health in the city of New York, in 1806, appointed a committee to report on measures necessary to secure the public health. The following extract from the report, which was drawn by Dr. Edward Miller, says: "Interment of dead bodies within the city ought to be prohibited. A vast mass of decaying animal matter, produced by the superstition of interring dead bodies near the churches, and which has been accumulating for a long time, is now deposited in many of the most populous parts of the city. It is impossible that such a quantity of animal remains, even if placed at the greatest depth of interment commonly practiced, should continue to be inoffensive and safe. It is difficult, if not impracticable, to determine to what distance around the matter extricated during the progress of putrefaction may spread; and by pervading the ground and tainting the waters,

and, perhaps, emitting noxious exhalations into the atmosphere, do great mischief. But if it should be decided still to persist in the practice of interments in the city, it ought to be judged necessary to order the envelopment of the bodies in some species of calcareous earth, either quicklime or chalk. * * * This growing evil must be corrected at some period, for it is increasing and extending, by daily aggregation, to a mass already very large, and the sooner it is arrested the less violence will be done to the feelings and habits of our fellow-citizens." This report being sent to the Legislature with a memorial upon the subject, resulted in the passage of a law authorizing the corporation of the city of New York to prohibit interments within its limits. The law was afterwards incorporated into the general statutes of the State. It was not till 1823 that the common council of New York passed a prohibitory ordinance upon the subject, and, when passed, it was some years before it became operative.

Dr. Elisha Harris says: "Trinity church-yard has been the center of a very fatal prevalence of cholera, whenever the disease has occurred as an endemic near or within a quarter of a mile of it. Trinity Place, west of it; Rector street, on its border; the streets west of Rector, and the occupants of the neighboring offices and commercial houses, have suffered severely at each visitation of the pest, from 1832 to 1854." Dr. John W. Rauch, in an excellent monograph on interments in populous cities, and their influence upon health and epidemics, says: "During the prevalence of the cholera at Burlington, Iowa, in July, 1850, a number of dead were interred in the city cemetery. No deaths occurred in its neighborhood until about twenty had been buried there. After this, until the epidemic ceased, cases occurred, and always in the direction from the cemetery in which the wind blew." Dr. Bryant, "On Yellow Fever at Norfolk and Portsmouth," in 1856, after giving a history of the epidemic and its terribly fatal results, and offering some suggestions upon a future correct hygiene, says: "The last, and at the same time one of the most important of these suggestions, relates to the remains of the dead. They can scarcely be said to rest beneath the sod. * * * When the summer's sun shall pour its rays down upon this decaying mass, can it be otherwise than that their noxious gases will commingle with the purer air, and sooner or later aid in reproducing other harvests of disease and death? * * * The remedy here indicated is the disinterment of the dead, and their removal to a distance of not less than eight miles from either city. It is the total forbidding of intramural or even near-

by suburban cemeteries." Dr. Buck, in his work on hygiene, says: "It is impossible to say how long the *materies morbi* may continue to live under ground. If organic matter can be boiled and frozen without losing vitality, and seeds 3,000 years old will sprout when planted, it would be hardihood to assert that the poison of cholera, yellow fever or small-pox, whatever it is, may not for years lie dormant, but not dead, in the moisture and temperature of the grave."

But we will now cite some cases in our own State which reveal a condition of things horrible almost beyond belief. The Weehawken Cemetery, in Hudson county, has required legal proceedings on the part of the authorities there. A communication is on file at the office of the State Board of Health, accompanied by affidavits, which gives a series of facts such as show it even now to be a great public peril. From the statements, we learn that the grave-yard is owned by a private corporation. It has been used for interments for sixteen or seventeen years. The cemetery contains but seven acres, and from ten to twelve thousand bodies have been crowded into its narrow limits, and, from the evidence adduced, the land is totally unfit for burial purposes. Jacob Haushe, who resides on the north side of the cemetery, testified to a most revolting state of things. He says, that a very bad smell pervades the whole neighborhood, the fœtid odors arising from the corpses of the dead. Haushe describes the smell as that of "rotten carrion," extremely offensive. We visited the cemetery, and the smell was even worse. The ground was cracked open and the cracks emitted a stench that poisoned the atmosphere. The cracks were afterwards closed up, but subsequently the carrion oozed out from the ground, smelling most offensively. The receiving vault in the grave-yard also emitted very noisome odors. Visitors at Haushe's house have complained of the smell, not only while passing the cemetery, but while sitting in the house. This condition of things, the witness testified, has continued for a long time. Other witnesses testified that the odors arising from the graves are "like those of decayed human flesh—a peculiar smell, and very offensive." Many of the families resident in the vicinity of the cemetery testified that much sickness in their families was produced thereby. It seems impossible that such things can exist in a civilized community, but they are well attested by reputable people, long-time residents of the neighborhood.

From the apathy evinced in many parts of this country in the disposal of the dead, it would seem that nothing short of one of those

terrible epidemic inflictions which the Almighty has allowed to be the penalty of the breach of His laws, will bring the people to a sense of the evils and perils of such abominations. There can be no doubt that, under any circumstances, in densely populated neighborhoods where cemeteries have been in use for a long time, the practice of burying within the precincts of towns is, unless guarded by the strictest regulations, most productive of injury to the health of the inhabitants.

The following statement explains itself:

"Dr. Warman—In compliance with your request, I make the following report concerning the Mercer Cemetery, Trenton, New Jersey: On a Monday, September, 1861, eleven men were set to work to prepare the ground for the building of the present passenger depot of the Pennsylvania Railroad, and also the road-bed for the necessary tracks. The ground was a swamp, covered over with a dense growth of willows, alders, magnolias, &c., situated in the valley of the Assanpink creek. On the following Monday morning, seven of the men were dead, and the other four confined to their beds, dangerously ill. These subsequently recovered their health, but each was attacked with a skin disease of the face that has hitherto resisted all treatment. One of the men is dead; the other three are still living.

"*Geological Formations*—The substratum of the plateau upon which the cemetery, depot, and railroad tracks are located, is gneiss; dip of strata, forty feet; trend, northeast and southwest. This is covered with gravel and coarse sand for twenty or thirty feet, and then a superstratum of four or five feet of loam.

"The stream has cut a valley some twenty-five feet deep, at right-angles with the trend of the gneiss. The cemetery is located upon the west side of the creek, on the top of the plateau, some twenty-five feet above the swamp, and here the ground-water from the plateau finds its outfall into the above-named swamp. After the ground was cleared of bushes and the filling-in of the quagmire was commenced, the stench from the disturbed mud was almost unendurable, and the men could only work during a few hours in the middle of the day.

"Owing to the existence of the war at that time, labor was very uncertain, and, hence, the history of the men cannot be traced. But this much is certain, that many persons were employed and left on account of sickness, and that a virulent fever attacked many of the persons who lived near by. The physicians called the disease typhoid fever. Whatever its proper name it was very fatal, and the more so the nearer the swamp and cemetery.

"The cemetery is located about two hundred and fifty feet from the valley west, and was first used in 1842. The soil in which the bodies are buried is coarse sand and gravel, hence most favorable for rapid decomposition. A low state of vitality has characterized the employes of the railroad serving about the depot, and many have had to leave on account of broken health."

The above communication was handed me by Dr. J. I. B. Ribble, of the city of Trenton, whose attention was called to the above-stated facts from having treated two of the sufferers for the peculiar skin affections alluded to. There can be no question but that the emanations from the decomposing bodies and the digging up of the saturated soil was the cause of the virulent fevers that prevailed at the time in the neighborhood.

This brings us now to the consideration of the methods of disposal of bodies as buried, most favorable to natural decay. There are two modes of interment practiced in this State—one in graves and the other in tombs. We much prefer the former. As has been noticed, dangerous gases often escape from tombs when insecurely closed, or when often opened for new deposits. Besides these evils there is no security that deposits in tombs will ever return undisturbed to the earth. They are there exposed to removal and desecration, which sometimes takes place (as in the case of A. T. Stewart).

Very properly, we think, tombs are not allowed in many parts of our country. Graves alone are used. Mount Auburn Cemetery, near Boston, is a notable example of this. "Earth to earth," seems to be the generally adopted plan of burial at the present time, among all civilized nations. Much has been said lately of a return to the practice of interring the dead without the medium of a coffin. Why should we not go to our graves in our habits as we lived? as in the case of the soldier described by Wolfe:

> "No useless coffin enclosed his breast,
> Nor in sheet nor in shroud we wound him;
> But he lay like a soldier taking his rest,
> With his martial cloak around him."

It is not at all unlikely that this method will be chosen by many as a settlement of the sanitary questions that have sprung into notice since cremation has been once more broached.

In the Norman dynasty it was the custom to bury in the bare ground. Also in the time of Edward II. and Edward III., even persons of distinction preferred to have their bodies committed to the bare earth. It was the common custom in the time of Queen Elizabeth to bury only in winding sheets. Interment in the bare earth was the common method among the Jews and other nations as well. It is supposed that the dead bodies of the pilgrims at Plymouth, so many of whom died during the first winter, were thus laid. In Dr.

Samuel A. Green's *Early Records*, are the items of a town clerk's funeral expenses. They are: "A winding sheet, 18*s.*; coffin, 10*s.*; grave digging, 7*s.* 6*d.*"

Mr. Seymour Hayden, of London, would abolish coffins altogether, and substitute wicker-work filled with flowers. The proposal is new and has been recommended with great force, and we have no doubt but that, if introduced here, would meet with popular favor. The question is, will the abolition of coffins improve matters? We fear the result might be something like the following extract: "In the course of walking round the city we had occasion to pass through one of the cemeteries, but the horrible effluvia from the graves obliged us to alter our course. The Turks do not make use of coffins. Having dressed the dead, they place over the body a few thin pieces of wood, and then cover it with earth. Heavy rain has often the effect of opening passages down to the putrefying mass, occasioning that pernicious and terrible smell which we experienced, and to which in some degree might be attributed the frequency of pestilential diseases in Turkey." The interment of a body in a mere shroud is no new idea. There can be no doubt that in ancient times the practice was almost universal among those who buried their dead. It is hoped that by dispensing with the coffin the body will sooner return to the elements, about which there can be no question; provided, that the earth in which it is interred be a suitable one. But that is not always the case, for under certain circumstances of humidity in the soil, the muscular fibres of the body, for instance, are converted into adipocere. Soils which keep out the atmospheric air are nearly always favorable to the generation of this substance.

This kind of earth, it need hardly be stated, is unsuitable for sepultural purposes. The ground chosen may not only be too damp and clayey, and impervious to air and moisture, but it may be of too open a character. Were we to bury in light, gravelly soil of this class without coffins, it is not unlikely that the foul gases would rise faster than they ought. We do not know why coffins were originally resorted to; but it is just possible that our forefathers discovered that, in certain soils, the earlier and fouler stages of decomposition proceeded at too rapid a pace for the comfort of the living. The depurative character of the soil was not equal to the demand made upon it. This is not an altogether theoretical statement, for an eminent foreigner has noticed that this is the case in grave-yards which he had visited. A coffin may therefore be a desirable thing under some circumstances.

It is a fit question to consider, also, whether it would be safe to carry a person who perished (for instance) with small-pox, without protection by means of a coffin. Mischief would be less likely to result, after such a lapse of time as was found necessary to destroy the coffin. Here is where the advantages of cremation appear, for with the body is burned up all disease germs. The thing to consider is, How many persons die with contagious diseases, the germs of which not even the earth can destroy? It is not so much a question of coffin or no coffin. When the Minchinhampton church-yard was disturbed, and the black earth carted away to the gardens round about, the population was simply decimated, and the same would have occurred, one would imagine, even if the coffin-earth had been absent.

The sanitary requirements for a cemetery indicated under the foregoing remarks, may, therefore, be summed up under the four following headings:

1. Suitable soil.

2. A suitable position with respect to population and sources of water supply.

3. Sufficient space.

4. Proper regulations and management.

Very much depends upon the soil of a cemetery. Dr. Parsons, in the eleventh annual report to the Local Government Board of England, says: "The soil should be of an open, porous nature, with numerous close interstices, through which air and moisture may pass in a finely divided state, freely in every direction. In such a soil decay proceeds rapidly, and the products of decomposition are absorbed or oxidized. The soil should be easily worked, yet not so loose as to render the work of excavation dangerous, through the liability to falls of earth. It should be free from water, or hard rock, to a depth of at least eight feet. If not naturally free from water, it should be drained, if practicable, to that depth; to this end it is necessary that the site should be sufficiently elevated above the drainage level of the locality, either naturally or where necessary by filling it up to the required level with suitable earth. Loam or sand, with a sufficient quantity of vegetable mould, are the best soils; clay and loose stones the worst. A dense clay is laborious to work and difficult to drain; by excluding moisture and air it retards decay, and it retains in a concentrated state the products of decomposition, sometimes to be discharged into graves opened into the vicinity, or sometimes to escape through cracks in the ground to the surface. A loose,

stony soil, on the other hand, allows the passage of effluvia." And with reference to the site to be chosen for a cemetery, he further says: "Nevertheless, in view of the evils which in former times have undoubtedly arisen from the practice of intramural sepulture, and also because the erection of houses near a cemetery interferes with the free play of air around and over it: the place of burial should, therefore, be selected in a somewhat secluded and not in the most conspicuous part of the town, and should also be combined with such natural scenery as will tend to inspire those feelings of solemnity and decorum which properly belong to the 'city of the dead.' It should not be where it would ever be liable to be encroached upon for buildings, roads or any other purpose, but where the tenants may remain forever undisturbed in their quiet resting-place; and it should be large enough to meet the wants of the probable future growth of the town which it is designed to accommodate. Parts of such a cemetery might be assigned to a peculiar religious denomination, and, if desired, specially consecrated for its use. It should never be within a populous city or town." Such a site is now generally regarded as dangerous to the health of the living, though in this country we have not as yet experienced to a great extent the evils that have existed in London and other large cities in England. "It is highly desirable that interments should not be made up to the extreme edge of the cemetery, and it would be possible, without great waste of space, to reserve in all cases a strip of ground, free from interments, fifteen to thirty feet in width, around the whole cemetery in the interior of the boundary fence. This strip should afford room on the inside for a gravel or asphalt walk, to give access to all parts of the cemetery, and on the outside, next the fence, to a belt of shrubs or trees, the rootlets of which, penetrating the soil, would arrest and assimilate any decomposing matters percolating to the exterior of the cemetery. Obviously a cemetery should not be placed on elevated ground above houses, where the soakings from it may percolate to the sites and foundations of the dwellings below." Sites are, of course, unsuitable which are liable to be flooded or to land-slips, or which are in danger of being washed away or encroached upon by streams or the sea. Very steep sites are not desirable. The cemetery should be accessible by good roads from all parts of the district. The selection of a proper site for a cemetery, on sanitary and other grounds, is one of the greatest importance, and any one who has this duty to perform cannot do better than keep the following words of the well-known English sanitary engineer, Mr. Eas-

sie, before him. He says: "A well-chosen cemetery is one whose soil is dry, close and yet porous, permitting the rain and its accompanying air to reach a reasonable depth and so expedite decay. The formation is also well covered with vegetable mould, which assists in neutralizing any hurtful emanations and encourages the growth of shrubs. The subsoil is also of such a character as to need no underdraining and such as will prevent the water from lodging in any grave or vault. It will also stand exposed to the north or northeast winds, which are dry and do not hold the putrefactive gases in solution like the moist south or southwest winds. An improperly chosen graveyard may be said to be one where the soil is dense and clayey and impervious to moisture. It will be insufficiently drained, necessitating the use of planks to walk upon in wet weather. It will be too close to the abodes of the living; too small to permit a proper planting; the graves may be covered with flat stones, which prevents the passage downwards of the air and rain; and surrounded, moreover, by high walls which exclude the fresh air. The grounds will be stony and insufficiently covered with vegetable soil. No natural outfall will exist, and the drainage water must be pumped up, the bare idea of which is horrible. It will be near, also, to a water-bearing strata or to a reservoir. Long before decomposition has taken place, owing to the smallness of the site, and the impossibility of obtaining more land, except at high building prices, the organic matter hidden out of sight will be far too large in proportion to the area."

The dangers to the public health to which places of burial may give rise, are of two kinds, viz.: the contamination, first, of air, by volatile particles or gases; and, second, of drinking-water, by suspended or soluble products of decomposition. Foul liquids from graves may enter and pollute a stream; or wells in the vicinity of a grave-yard may be injured by percolation from it; and, in either case, if the water be used for drinking, injury to health may result. The liability of wells to pollution obviously depends, partly upon their proximity to it, and partly upon the configuration and geological structure of the ground. Thus, an intervening and impervious bed of clay will prevent foul matters reaching a well; and filtration through a sufficient space of porous, aerated soil decomposes such matters into harmless, inorganic substances, which are fixed by the soil or taken up by plants. It is necessary, therefore, in order to obviate risk from this cause, that a cemetery should have a suitable soil and

be properly drained, and that it should be at a sufficient distance from subterraneous sources of water-supply; and in such a position with respect to them, that the percolation of foul matters from one to the other may be impossible.

The Massachusetts State Board of Health (report of 1875) notices the following examples of water-pollution which had been recently reported: "At a meeting at Milan, Dr. Polli, to prove that inhumation taints air and water, referred to certain researches of Prof. Selmi, of Mantua, and to chemical analyses of the waters of Milan, by Professors Parvesi and Rontondii. M. Ducamp discovered, in Paris, a well, the water of which was entirely derived from cemeteries. It had acquired a sulphur-like taste, so that the people bought it for mineral water." The following case is also furnished: "In the last remarkable report of the Faculty of Medicine of Saxe, Reinhard relates that nine large and several smaller victims of the cattle plague were interred at Dresden, at a depth of ten or twelve feet. It was found, the next year, that the water from a well situate one hundred feet from the pit in which they were buried, had a fœtid odor, and contained butyrate of lime. At a distance of twenty feet it had the disgusting taste of butyric acid; and each quart contained about thirty grains of this substance." The water from grave-yards contains ammonium and calcium nitrates, and nitrites, and sometimes fatty acids and much organic matter. Lefort found a well of water, at St. Didier, more than three hundred feet from a cemetery, to be highly contaminated with ammoniacal salts, and an organic matter left on evaporation. The water was clear at first, but had a vapid taste.

A recent report on the preservation of the anthrax germ in graves, furnishes the following fact: "In Livingston county, New York, on a sandy soil over a heavy clay soil, the graves were carefully fenced in by direction; but nearly a year after, during a rainy period, the liquid, oozing out on the river-bank between the clay and sand and opposite one of the fenced graves, was licked by six of the cattle, all of which promptly perished of anthrax. The grave was now fenced in down to the water, and no further deaths occurred."

In the selection of a cemetery site, the pollution of wells and of water-supply should receive especial attention. Thus, it is stated in a collection of reports concerning the cemeteries of the town of Versailles, that the water of the wells which lie below the church-yard of St. Louis could not be used on account of its stench. In consequence of various investigations, in France, a law was passed prohibiting the

opening of wells within 100 metres of any place of burial; but this distance is now said to be insufficient for deep wells, which have been found, on examination, to be polluted at a distance of from 150 to 200 metres. In some parts of Germany the opening of wells nearer than 300 feet has been prohibited.

In the report of the Board of Health of New Jersey, 1880, we find the following from a writer in the northern part of the State: "Another great nuisance in some parts of the county is the grave-yard; such a one as we have in the village of ——, in the shape of a burying-ground. It is in the center of the village, and on the elevated side of the street. The church is in the grave-yard. Private dwellings are situated on the lower or other side of the street. Each house has a well of water for family use. The water runs from the grave-yard into these wells. The old sexton of this church told me a number of times, that when graves were dug in certain parts of the yard, the wells would become soiled and muddled during the process of digging. The children of the Sunday school drink out of these wells; and the children of the public school in the place patronize them, as the school has no well of its own, and, if it had, the school house is situated at the lower end of the grave-yard. This grave-yard is a confirmed nuisance. It is an old yard, and the community still bury in it. The land is wet and soggy in the yard. There are a number of good locations, within a half mile of the village, for a cemetery; soil dry and pleasant. I urge strongly on the State Board of Health, that an act of the Legislature be passed preventing any more burials taking place in this grave-yard."

Another writer, from another county in New Jersey, remarks that burial-grounds are mostly connected with churches, and raises the question whether churches which are closely crowded upon by graves, and not occupied during the week, do not become receptacles of grave-yard air and thus risk the health of the Sabbath worshipers, especially in those churches heated by furnaces, which cause a current of air from without laden with noxious gases. Again, in the report of the Board for 1882, the same complaint comes from a writer in the southern part of the State. He says: "In the principal village of this township the well water is exceptionally bad, and of offensive smell. As the grave-yard, now well filled with the dead, is near the center of the village, and on a rise of ground, and all the wells, with offensive odor and bad taste, are east of the grave-yard and near by, (my own is about twenty paces,) I have long ceased to use my well for drinking

purposes, believing it to be contaminated with the decomposition of the dead bodies. I have noticed that all the families living east of the grave-yard have more or less sickness, and a great deal more than those living west of it, as the streams all run east to the bay shore. This may account for it. I had one death in my own family, and several others sick with typhoid fever. This happened several years ago. Since then we have stopped using well water, and have been free from any diseases traceable to bad water."

In the report of the British Local Government Board, before noticed, upon the relations of a cemetery to sources of water-supply, we read: "It is evident that the drainage of a cemetery should not be allowed to enter a stream from which water is drawn for domestic purposes. The degree to which the purity of neighboring wells is endangered by a cemetery, and the distance to which contamination may extend, obviously depend in each particular case upon the relative elevation of the respective sites, of cemetery and well, and upon the nature and dip of the intervening strata, so that it would seem impossible to lay down a general rule for all cases. Fissured rock might allow foul matters to traverse considerable distances, while the interposition of a bed of clay, or a water-tight vault, would shut them off, or the passage through an aerated stratum of finely divided earth would oxidize and destroy them on their way. A dangerous state of things is when the graves and wells are sunk together in a shallow, superficial water-bearing stratum of a loosely porous nature, resting on impervious clay."

CONTAMINATION BY AIR.

This may take place in several modes. The gases evolved from putrefying bodies may make their way to the surface through pores or fissures in the ground, or may pass into open graves dug in the neighborhood, or they may diffuse themselves laterally through the ground air, and be drawn up into the interior of houses or churches; or noxious emanations may be given off from putrid drainage water, whether bailed out of graves and thrown upon the surface, or draining into open channels or water-courses. Thus nuisance and danger to health may be occasioned not only to grave-diggers and persons attending funerals, but also to the inhabitants of houses in the neighborhood of the burying-ground. To obviate these risks it is necessary that the number of decomposing bodies in a given portion of ground should not at any time be so great that the gaseous products

cannot be oxidized into harmless substances in the interstices of the soil or taken up by vegetation, that a sufficient depth of earth intervene between corpses and the surface, and that the soil be of a suitable nature and properly drained, the drainage water being harmlessly disposed of. Furthermore, since the atmospheric contamination which has to be especially guarded against, is that of the air in the interior, and neighborhood of human habitations and frequented places such as churches, it is necessary that the place of burial should be in an open situation and at a sufficient distance from dwellings or churches, in order that any effluvia arising from it may be diluted by the winds so as not to find their way in an injurious state of concentration to places where they will be liable to be inhaled.

The geological structure of the earth, the character of the soil, its water-bearing strata, its slope, and its deep and effective drainage have much to do with its adaptability. Then, again, there is a great difference in the capacity of ground to get rid of the products of decay. Cases have been brought to our notice where school houses are located at or very near burial-grounds, or where basements of churches, located in and among graves, are used for school and meeting purposes, in many of which a furnace is located for heating purposes; the hot furnace acting as a great suction pump for the grave-yard air that may be laden with the products of decomposition. A hot furnace in such a place may do serious harm. The writer of this can give testimony in relation to a school house located in one corner of a country grave-yard, in which, during the months of August and September, a number of bodies had been placed that had died from epidemic dysentery. Soon after burial a heavy rain storm followed. The soil was a heavy clay. Large cracks formed in the soil over the graves, and a sickening odor escaped, so much so that the windows on the side adjacent to the grave-yard had to be closed, and the teachers and children were both affected for a time. Mr. Hutchinson, Surgeon, of Farrington street, London, says he was called to attend a girl aged fourteen, who was suffering with typhus fever of a highly malignant character. The girl was the daughter of a pew-opener in one of the large city churches situated in the center of a small burying-ground which had been used for interment for centuries, the ground of which was raised much above its natural level, and was saturated with the remains of the bodies of the dead. There were vaults beneath the church, in which it was still the custom, as it had long been, to bury the dead. The girl in question had recently returned from the country, where

she had been at school. She assisted her mother in shaking and cleansing the matting of the aisles and pews of the church, a few days before being seen by Mr. Hutchinson. The mother stated that this work had usually been done once in six weeks; that the dust and effluvia which arose always had a peculiar fœtid and offensive odor, very unlike the dust which collects in private houses; that it invariably made her (the mother) ill for at least a day afterwards, and that it used to make the grandmother of the present patient so unwell that she was compelled to hire a person to perform the duty. On the afternoon of the same day on which this young girl, now ill, had been engaged in her employment, she was seized with shivering, severe pain in the head, back and limbs, and other symptoms of commencing fever. On the following day all these symptoms were aggravated, and in two days afterwards malignant fever was fully developed.

Among others who obviously suffer from this cause are the families of clergymen, when, as occasionally happens, the parsonage is situated very close to a full church-yard. Dr. Stephen Wickes, of Orange, N. J., in an excellent treatise on sepulture, (Transactions New Jersey Medical Society, 1883,) says: "One clergyman's family I know of, whose dwelling house is so close to an extremely full church-yard, was annoyed by a very disagreeable smell from the graves, always perceptible in some of the sitting and sleeping rooms. The mother of this family states that she has never had a day's health since she has resided there, and that her children are always ailing. Their ill health is attributed both by the family and their medical friends to the emanations of the church-yard."

It is stated by Sir James Macgregor that on one occasion, in Spain, soon after 20,000 men had been put into the ground within the space of two or three months, the troops that remained exposed to the emanations of the soil, and that drank the water from the wells sunk in the neighborhood of the spot, were attacked by malignant fevers and by dysentery, and that the fevers constantly put on the dysenteric character.

The placing of a dead body in a grave, and covering it with a few feet of earth, does not prevent the gases generated by decomposition, together with the putrescent matters which they hold in suspension from permeating the surrounding soil, and escaping into the air above and the water beneath. "I have examined, says Dr. Lyon Playfair (1881), various church-yards and burial-grounds, for the purpose of ascertaining whether the layer of earth above the bodies is sufficient

to absorb the putrid gases evolved. The slightest inspection shows that they are not thoroughly absorbed by the soil lying over the bodies. I know several church-yards from which most fœtid smells are evolved, and gases with similar odors are emitted from the sides of sewers passing in the vicinity of cemeteries, although they may not be more than thirty feet from them."

The first result of the smell from a grave-yard is generally headache. A military officer said that when his men occupied as a barrack a building which opened over a crowded burial-ground in Liverpool, the smell from the ground was at times exceedingly offensive, and that he and his men suffered from dysentery. A gentleman who had resided near that ground said that he was convinced that his own health and that of his children suffered from it, and that he had removed to avoid further injury.

The following testimony of a lady at Manchester is added as an example of how air may be contaminated *by sewers near grave-yards* and cemeteries: "You resided formerly in the house contiguous to the burying-ground of ——— chapel, did you not? Yes, I did, but was obliged to leave it. Why were you so obliged? When the wind was west the smell was dreadful; there is a main sewer runs through the burying-ground, and the smell of the dead bodies came through this sewer, up our drain, and until we got that trapped it was quite intolerable. Do you think the smell rose from the emanations of the sewer and not from the burying-ground? I am sure they came from the burying-ground; the smell coming from the drain was exactly the same as that which reached us when the wind was west, and blew upon us from the burying-ground; the smell was very peculiar; it exactly resembled the smell which clothes have when they are removed from a dead body; my servants would not remain in the house on account of it. Did you observe any effect upon your health when the smells were bad? Yes; I am liable to headaches; and these were always bad when the smells were so also; they were often accompanied by diarrhœa in this house; before I went there, and since I left, my headaches have been trifling. Were any other of the inmates of the house affected with illness? I had often to send for the surgeon to my servants, who were liable to sore throats. And your children, were they also affected? My youngest child was very delicate, and we thought he could not have survived; since he came here he has been quite strong and healthy."

In the course of an examination of the chairman and surveyor of

the Holborn and Finsbury Division of Sewers, on the general management of sewers in London, the following passage occurs: "You do not believe that the nuisance arises in all cases from the main sewers? Mr. Roe—Not always from the main sewers. Mr. Mills—Connected with this point, I would mention that where the sewers come in contact with the church-yards, the exudation is most offensive; have you noticed that in more than one case? Yes. In those cases have you had any opportunities of tracing in what manner the exudations from the grave-yard passed to the sewer? It must have been through the sides of the sewers. Then, if that be the case, the sewer itself must have given way? No; I apprehend, even if you use concrete, it is impossible but that the adjacent waters would find their way through the cement; it is the natural consequence; the wells of the houses adjacent to the sewers all get dry whenever the sewers are lowered. You are very certain that in the course of time exudations very often do, to a certain extent, pass through the brick-work? Yes; it is impossible to prevent it. Have you ever noticed whether there was putrid matter in all cases where the sewer passed through a burial-ground? The last church-yard I passed by, in the parish of St. Pancreas, when the sewer was constructing, I observed that the exudation from it into the sewer was peculiarly offensive, and was known to arise from the decomposition of bodies. At what distance was the sewer from the church-yard? Thirty feet."

That these emanations do act injuriously on the health of the people resident in the immediate neighborhood of the places from which they issue, appears to us, by the evidence that has been adduced, to be indubitably established.

SUFFICIENCY OF SPACE.

On sanitary grounds, it is requisite that each corpse shall be surrounded and covered by a mass of earth sufficient to deodorize and destroy the putrid emanations proceeding from it, and also that the total amount of space shall be so great that it may not be necessary to re-open any grave until the body previously interred therein shall be completely decomposed. With regard to the amount of land necessary for a cemetery, Dr. Parsons calculates that about a quarter of an acre of land for every thousand of the population of the community to whom the cemetery belongs, is the usually estimated minimum, but this is far too small a proportion even for a cemetery possessing every advantage, and he further states the desirability of

providing more than the bare minimum of space is obvious, and is generally recognized. It must be remembered that, as a rule, quite one-sixth of the total area of a cemetery is taken up by roads, paths and ornamental grass or beds of flowers and shrubs, the chapels, mortuaries, lodges, &c., and sufficient width should be allowed between each grave-space to permit every grave being reached without trampling on others. A standard of 110 burials per acre has sometimes been taken, but this appears to be rather a small one. It has been estimated by others that an acre of ground is capable of affording decent burial to not more than 136 bodies yearly, but in the thirty-seven burial-grounds of Liverpool, taking one with another, the number of burials to an acre is fully double that just stated. Were the calculation confined to the burial-grounds most in use, the proportion would be greatly augmented. Therefore, the whole subject of the locality of the cemetery should be regulated by authority, so that the graves of the multitudes of the dead should not be close to the habitations of the living, so that the air we breathe and the water we drink should not become contaminated with the product of decaying animal matter.

Therefore, since inhumation is the generally adopted method of disposing of the dead at the present time, and in view of all the evils that have been pointed out in the past and that may arise in the future, it is plainly apparent that *no cemetery should be located or managed without due authority from some sanitary board.*

In conclusion, I cannot do better than to quote from the admirable and exhaustive treatise on Sepulture, by Dr. Stephen Wickes, already alluded to. He says: "The country towns in the vicinity of our great cities have become suburban; small villages have become considerable cities. The population, as it increases, crowds upon the old and venerated burying-places, and they are enlarged to meet their increasing interments. The authorities of such towns are stimulated by their growth to add to their attractions by improvements in their drainage, by abating nuisances, and by conveniences of various sorts; but when, as has occurred in some towns, they are warned of the dangers of the grave-yards, and importuned to abate them, they let them alone, to receive their annually increasing dead, to exhale their noxious miasm, to pollute their water-supply, and to become nuisances of a daily increasing power for evil. The most of the governments of Europe have prohibited intramural interments absolutely. In our own country, the disposal of the dead has not been a subject of legis-

lation by State legislators, to whom it properly belongs. The regulation of burials has been left to municipal authority, liable to be governed in its action by local influences. * * * The legislatures of our States adopt laws of quarantine to protect the people from the importation and consequent spread of contagion. The State of New Jersey, perhaps others, provides by a general law against the infection of cattle. Our law-makers do not recognize as they should the fearful dangers of the inhumation of human bodies dead from malignant diseases, with its specific germs—germs which float in the air we breathe and the water we drink; germs which neither boiling or freezing can destroy; germs which, after being buried in the earth for centuries, when brought to the surface by excavations produce a pestilence, and which, like vegetable seed germs buried for ages in the earth, when brought to the surface bring forth fruit after its kind. * * * Inhumation commends itself to the traditional sentiments of the people, and an innovation upon these is not demanded. * * * Rural cemeteries, properly regulated, under wise control, guarded by good laws, and permanently extramural, afford all necessary protection to the public health."

SANITARY INQUIRIES AS TO HEALTH RESORTS AND OTHER LOCALITIES.

The examination of the various health resorts of the State was commenced about the 20th of April and continued at intervals during the year. Our object was to find the present condition, and, also, how far suggestions made in former visits had been carried out. It was gratifying to find that, with rare exceptions, great improvement was manifest, both in the diligence and intelligence of Boards of Health. At Cape May, the sewer system had been extended, and more attention given to the ventilation of the sewers, especially at the points of house connection.

It had been noticed the previous year that one large hotel was greatly needing a reconstruction of its sanitary arrangements. It was unfortunate that this was not reached more promptly, but the building has now been greatly improved in its sanitary condition. If only the management of the hotels and large boarding houses is made as good as that of matters outside of buildings we believe prevalent healthfulness will result. There must be a thorough system of house to house inspection by those competent and fearless, and a report to the Board of Health of any deficiency either in construction or administration.

CAPE MAY POINT.

This locality has recently come into notice as a winter as well as summer resort. An examination showed that it was dependent on driven wells, which differed somewhat in the quality of the water. The drainage is not so good as it should be, but it is hoped that ere this unnecessary pond holes have been drained and filled.

The provisions of the hotels as winter resorts were incomplete, and a thorough reconstruction as to sanitary arrangements in that occupied

for the winter was recommended. The owners have now taken hold of the problem fully and are applying the "Pullman" method to the drainage and sewerage of the entire city.

VINELAND.

This inland resort was found to have made many important improvements during the past year. A system of inspection is carried out, and a Board of Health with intelligent activity and full powers is diligent in its service. In a few cases of dilatory action on the part of occupants of property we had the opportunity of seeing the recognition of health authority, and feel sure that great progress is being made. The people respond to these improvements and thus help to aid in the appreciation of the locality as a place of winter and spring sojourn.

ATLANTIC CITY.

The great sanitary event of the year for this city has been the introduction of a water supply which seems entirely satisfactory, both as to quantity and quality. Already the reward has come in increasing confidence in the city as both a winter and summer resort. The Board of Health has been aroused to new vigor, and is doing a great work in the interests of the city. A Health Inspector has been appointed, who devotes himself to an investigation of the sanitary condition of the city. The removal of garbage is much better managed than formerly. The rules as to privy construction and cleansing are more diligently enforced. Better than all, the city itself, or enterprising citizens thereof, have come to realize that it was in vain to point to natural advantages, to sandy soil, or to former crude methods of slop-water disposal, as adequate to the care of the liquid refuse of so large and crowded a resort.

Hence a contract has been made by which all liquid material will be constantly carried out of the city by means of sewers to a distant point, where it will be mechanically and chemically treated and utilized. The system will be completed before spring, and thus enable all hotels and boarding houses to connect therewith. Visitors hereafter will not be content to sojourn where such provisions are not secured. The authorities will no doubt see to it that these sewers are properly flushed and ventilated. The city seeks the prompt removal of all decomposable materials without its transfer into any

adjacent waters. The spirit and enterprise which have been manifested and the inspection which has been instituted, deserve and will receive recognition.

All these growing cities need to assert and exercise, through their Boards of Health, the right to secure healthy domiciliary conditions. The change of sentiment on some leading sanitary topics was not less encouraging than the actual activity which was manifested.

The city has now contracted for a system of sewers which will entirely remove all liquid refuse at once, and thus by the coming summer complete a sewer delivery and clarification at a distance beyond the suburbs.

POINT PLEASANT.

The development at this point has been so rapid the last year as to make it necessary to inquire carefully into its general situation and constructive arrangements.

Its water-supply is from driven wells of varying value. While many of these are reliable, it is advised that cisterns above ground be used for potable water until a more general supply is secured.

The water level of the soil is near the surface, and there is much need of efficient drainage. In parts, this is being attended to. The construction, as well as the emptying of all closets, should be in charge of a skilled inspector. It is one of those places which must depend upon active and intelligent regulation and administration.

A water company was formed early in 1883, and before another summer a full supply is probable. The proper garbage, water-closet and sewage disposal will depend upon the exercise of proper sanitary police, which is sure to exist if only visitors, in a way that is not captious, see to it that some system is being carried out.

OCEAN BEACH.

This locality shows no improvement in its care of sanitary conditions. The ground water level is high, and no skilled attention is given to drainage. The water-supply is mostly from driven wells, which are generally surface wells. Privy vaults are of the crudest construction. Slop-water is disposed of in cesspools, often in close proximity to wells. This sanitary lawlessness has not been without its deleterious results. The locality is capable of being made one of

the very best along the coast, but until a different system of construction and administration obtains, it is the duty of those who have care of the public health to state the facts. A year since we made personal appeal to those interested, but no skilled system of sanitary construction or supervision has been put in execution so far as we have ascertained.

ASBURY PARK.

This city is an excellent example of what good administration can accomplish. The Board of Health has for two or three years past had efficient organization and intelligent oversight of health interests. The system of sewers is well managed although not fully complete in details. While the liquid portion is carried into the sea, this is so managed as to be, as we believe, devoid of evil of any kind. At the point and at the time chosen, it cannot, as we see, in any way affect the bathing, and secures a thorough riddance of all slop-water. Privy construction and removal are conducted under skilled oversight. The flushing of the sewers is very efficient and they are so ventilated as to secure currents of air through them. If the individual housekeeping of the hotels and other buildings is kept on a par with the sanitary administration of the city, there can be no reason why it should not remain one of the most healthy localities along the coast. There is in most of the city good underground drainage, and the driven wells are down at an average of twenty feet. The care exercised over the ground and its purity goes far to secure purity of water. Yet it is well also to have an eye to larger growth and to such water-supply as is wholly independent of the ground on which a close population is to be crowded. Well-constructed cisterns are not relied upon along the coast to the degree that is warranted. These are especially to be commended to those smaller towns in which there is no general water supply or where the height of subsoil water and the management of slop and privy systems is such as to be of doubtful propriety. Asbury Park has done, and is doing, very much to secure a thorough sanitary administration.

OCEAN GROVE.

The sanitary prospects for Ocean Grove have been greatly improved the last year. The new driven well is shown by chemical analysis to provide a pure and wholesome water, and indicates that at other points a similar supply is likely to be secured as may be needed.

The system of sewerage has been entirely remodeled. It is based on the principle of the immediate and constant removal of all soiled liquids. Thus it is intended to avoid all cesspool storage. The continuation of pipes far out into the sea is said entirely to have prevented any return of the diluted liquids to the shore. The flushing of the pipes is easily secured and plans of upper air ventilation are being applied. While the ultimate result of all such systems must depend upon thorough and efficient administration, we can be sure that the prompt removal of all sewage will thus be secured.

Another year we shall seek to find precisely how many houses are attached to this system.

The Board of Health has been re-organized and seems to appreciate that the sanitary care of a health resort includes, not only water-supply and sewerage, but various other details which relate to sanitary, police, and public and personal health-care. House to house inspection each spring, a vigorous oversight by a competent sanitary inspector, and a book of sanitary entry which shall show the work done each day, and the inspections made, and the defects and improvements found, is indispensable to the welfare of any health resort. A reference to the annual summary will present other facts.

LAKEWOOD.

For many years that portion of Ocean county in and about Bricksburg has had some reputation as a health resort, especially for those suffering from pulmonary disease. Dryness of soil, protection from heavy winds, the influence of fine forests, and freedom from malaria, have been the distinctive features claimed. Within two years the erection of a commodious and well-appointed hotel as a winter resort has given new prominence to this inland winter home. The beautiful lake, the large pines and the lake-drive afford some local attraction. But its real advantage is in the choice of a proper locality for buildings, their construction according to the most approved designs, and their special adaptation to the purposes of a winter resort. The sanitary arrangements of the building are quite unexceptionable; each room has its fire-place and its supply of pine wood. The open and inclosed balconies are so related to sunlight and to moderated warmth as to make them genial on many a cold day.

The water of the lake contains a little iron. The rest of the mineral matter in the residue is mainly carbonate of lime. The total

solid residue, 2.77 grains per gallon, is very small, and the water owes its color to the peaty matter like that of cedar lands. It is believed by many that such districts are especially exempt from all malarial and other influences detrimental to health. We have no doubt of the feasibility of claiming Lakewood, Vineland, Atlantic City and Cape May as winter resorts, that in many respects easily vie with some more southern localities. The comparative value of those inland and those on the sea is yet to be determined. We feel sure that such a place as Lakewood is friendly to that rest and recreation which many a tired worker needs to seek in winter or in early spring.

ELBERON.

Elberon is dependent for its water-supply upon the Long Branch source. This has been improved in calibre of pipe and machinery the past year, so that the complaints of the previous year, as to deficiency at some points adjacent to Long Branch, or of insufficient pressure, are not likely again to occur. The cottages at Elberon are mostly dependent upon cesspools for removal of liquid refuse, but these are thoroughly cleaned and managed, it is believed, as well as cesspools can be. There is need to impress the thorough disconnection of cesspools from houses by means of a trap and a ventilating pipe between this and the buildings. As these cottages are mostly tributary to the hotel, there is no cooking, and but little refuse in many of them. The arrangements of the hotel deserve notice, because of their novelty. The water-closet system ends in two successive cesspools, so constructed that the overflow of the one goes to another more superficial, and so constructed as to secure safe soakage at a distance from the buildings. It has a safety method of preventing overflow which is said not to occur. The cesspools are carefully cleaned each season.

The slops and liquid refuse pass through a well-constructed grease tank, so located as to cool the liquids, and the grease is retained and removed once a week. The liquids pass to a large well-cemented cesspool in an area of the building. This is connected to an engine by an iron pipe, so that each day the entire contents are pumped out about a mile below the hotel; thus the principle of removal of fresh sewage is well applied, and the premises delivered of it before it becomes disease-breeding. Great care seems to be taken as to the details of cleanliness. Except in two or three minor particulars as to which suggestions were made, the system seems to be very efficient.

The outfall at a distance may eventually become a nuisance to that neighborhood.

LONG BRANCH.

Long Branch has great natural advantages, both for drainage and sewerage, and its water-supply is believed to be satisfactory. No system of drainage or sewerage has been adopted, and the public sentiment expends itself too much in discussion and too little in action. The hotels exhibit some of the very best, and some of the very worst, methods for the disposal of water-closet material and liquid refuse. Those, in general, are the safest which handle the vault material separately and in a dry form, and dispose of the fouled liquids by some other method. One or two hotels, which were found exceptionally bad the former year, have made considerable improvements. In others various devices are to be found. It is distressing to see the fondness for originality displaying itself in all sorts of contrivances, in order to get rid of filth by covering it up or soaking it in the ground. Ever and anon crude overseers are found giving themselves great credit for devices which leave "but ruts and botches in the work." The most of these are, perhaps, a little better than nothing, but quite ridiculous alongside the skilled methods now practiced by good artisans.

One hotel has five successive cesspools of enormous proportions, and at the end a boarded and covered filter bed of the crudest construction. At one point, on account of smells, a charcoal-house is built over the cesspool to diminish the odor. The only relief was to find a common workman, who said he got up every morning before the boarders in order to smell, and that he had but one rule, and that was, somehow, to correct all smells. His inventive genius in this direction was far more protective than anything we saw, and was the only thing that made the apparatus tolerable.

In another hotel, the closets were located over a worse cesspool, and the mode of delivery was the same. In another, enormous and more elaborate brick vaults had no modes of ventilation, and nothing but the shortness of the season protects the inmates. We do not present this as a uniform experience, and find exceptions as excellent as they are rare. But we have to say, that visitors at such hotels, before taking rooms, should, at their own expense, have a sanitary expert of acknowledged skill and trustworthiness to make a sanitary inspection

in their behalf. We have already done something to correct grave errors and to interrupt the policy of concealment. But if patrons will thus seek common protection, they can insure what is their right and aid in this beneficent life-preserving work. It is the intention of the State, through this Board, to insure to the tens of thousands that resort hither for health, protection from gross sanitary neglects. Reference is here made thereto, not because such places here are any worse than those in other States, and not because Long Branch is not a salubrious and most desirable retreat, but because the self-satisfied carelessness or uninformed presumption of some wealthy owners of hotel property have made light of these defects, and they have been tardy in their correction. And we also feel that, in all these places, local Health Boards have a duty, of inspection and of general provision for the removal of all refuse and fouled liquids, which they must not overlook, as indispensable to growth, to prosperity, and to that greater length of season which all of these places have a right to seek and expect.

Some other localities have been looked at with less exactness, but a notice of these will suffice as tests of what is being attempted or done along the coast-line of New Jersey, and in some other resorts, to promote the health and welfare of residents or patrons.

This Board, in its first examination, was careful to point out defects, and, so far as is its duty, to advise or to indicate the need of expert oversight. In some cases there were ready responses. In other cases there was proper and respectful delay, until the propriety of the advice given could be tested. In a very few, there was an evident conviction that glowing statements and assertions of salubrity, and self-devised plans of adjustment would suffice. Influences of various kinds, however, have so made themselves felt as to convince most that a sanitary basis is a part of the basis of success.

It is now assured that this shore will continue to be a favorite summer resort of tens of thousands, and that not a few in winter will, somewhere in this State, seek protection from the colder climes of the North. It is also settled that they will be able to find spots where skilled and constant attention will be given to sanitary construction, appliances and administration. While perfection will never be attained, while occasionally some disease may be brought, or may originate from the neglects of a single cottage, it is certain that the rule of these cities and boroughs will be to defend health. Those that make light

of such a view and adopt the policy of boastfulness, without facts to support their claims, will receive their reward.

But our knowledge of the various Boards of Health, of the public spirit of citizens, and our determination, as a Board, not to censure without discrimination, not to conceal, and only to boast where there is ground of security, leads us to feel confident that no health resorts will surpass these in prevision, and provision for the interests of patrons as well as for the welfare and success of residents.

INQUIRIES INTO THE CONDITION OF CHARITABLE AND PENAL INSTITUTIONS.

The duties devolving on the State Board of Health in examining the sanitary condition of asylums, prisons and almshouses, made it necessary for us also to inquire into the personal and hygienic management of inmates, the methods of confinement, etc., since it is quite impossible to separate the sanitary management of individuals from that of their surroundings.

The two State asylums show a careful attention to all the details of sanitary arrangement, as well as in general the application of those principles of mental and moral hygiene which are indispensable in the treatment and care of alienism. We believe the most of those connected with these asylums are not content to accept what was long years ago regarded as the essential and established methods, but are realizing that advances made demand a corresponding change in methods of dealing with this class of patients. Indeed, the progress of sanitary science has especially developed attention to this as a department of State medicine and public hygiene. There has come to be a fuller recognition that in no class of cases is the direction of cure or of relief more to be sought in a fuller comprehension of the possibilities of good food, good air, regulated exercise, employment and amusement, and of the relation of perfected hygienic conditions to relief. Such knowledge and a closer diagnosis between the various forms of insanity will yet lead to such modifications of treatment and of management as will quite change State methods of dealing with this dependent class.

It is felt to be a great misfortune that in most cases these essentials of return to physical and mental health are so neglected that often the first regret of the State alienist is that the subject has not earlier come within the sphere of his jurisdiction and control. Morbid conditions, in part dependent on physical states, or such as could be relieved by a

regulated hygiene, too often by delay become so fastened on the victim as either to embarrass or prevent recovery. Besides the personal infliction, the ward becomes a perpetual charge to the State instead of the grateful recipient of its restorative agency.

This will never be overcome by mere advice as to early admission. Such advice rarely, if ever, reaches those concerned, and if it did would need the personal endorsement of the skilled visitant. It would be a great gain to this charity, and an ultimate saving to the State, if each one of these institutions was at liberty to send the physician in charge, or his assistant, to examine into cases earlier and either indicate as to the treatment or advise as to their early removal to the institution. Many a one would thus never need to come, and others would come at a time when the prospect for recovery would be far more hopeful.

In reference to the county asylums, it must be said of them, as a whole, that the principles upon which they are governed are radically defective. The whole system tends to put the management into unskilled hands and not to provide for inmates that kind of special expert oversight which such a disease or which such dependency demands. There is nothing inviting in frequent examinations of the insane. The freeholders, however well intentioned, cannot be expected to acquaint themselves with the exact kind of oversight which is due. We have known such men to express their deepest mortification and regret at what has been found to be occurring under their own administration.

The physicians chosen are, in some cases, selected only for political reasons, and are persons who have not made a special study of alienism. Many of them frankly say so, and say that with their uncertain tenure of office they cannot afford special preparation and expenditure. As a rule, there is no resident physician in such institutions, and more than once have we been told that the visiting physician has never seen the deranged persons unless some rare and acute attack of sickness occurs. As a consequence there are serious neglects so common as not to be regarded as neglects. The solitary confinement of the insane is the rule in a part of the county asylums of the State, and the individual study of the cases is an exception to the rule.

In some cases incompetency results from defective knowledge and the absence of experience, in others from a total want of comprehension of the problem on hand and the possibilities of amelioration which intelligent authorities recognize. We are glad to be able to say, notwithstanding this, that the larger county asylums of the State

have been fortunate in their choice of chief officers and matrons, and have faithful medical oversight.

This Board has no reason to complain, for many of its suggestions have been accepted, but it has reason to know that there are defects in the system which either need to be given up or to be under classified administration. While the idea of economy is valuable and has been reached in some of these county institutions, it has too often been at an expense of uncharity, which is a poor compensation for the saving made. So long as the State contributes to the support of these county asylums it should see to it that the care, both medical, hygienic and personal, is of the proper kind. Indeed, this would be due to such afflicted persons who had become a public charge, because of their relation to the population of the State, but is also to be urged on grounds of economy. While we are not in sympathy with any captious or sensational review of State, county, city or township institutions, we cannot but feel that the sanitary, and social, and general management of these institutions and of their inmates is an important concern of legislators. These have been accepted as wards, and while under public care we are not to lose sight of the fact that their welfare has important relations, not only to their personal condition, but to the limitation of disease, pauperism or crime. As to the insane, it is enough to say that some defects in management in local asylums were so flagrant as, upon the complaints of this Board, to lead to partial or complete change of method. In other cases the mistakes are too adherent to the system to admit of correction until the State, by its directing superintendence, secures methods that are satisfactory. Less uncertain tenure of office for those who are capable, more uncertain for those who are not, and a system by which more than one person shall determine the disposition to be made of each case in hand in accord with the highest known intelligence as to the management of various degrees of unsoundness, are greatly to be desired.

JAILS, PRISONS AND REFORMATORIES.

The same statement will, in a modified degree, apply to the penal institutions of the State. It is to be remembered that the two thousand or more that are each year to be found in the various State or county institutions are mostly under short sentences, and are, therefore, to be returned to the population of the State. Some of them are hopelessly beyond the reach of reformation and should be kept, not so

much as a punishment as for the protection of society. There is another class who should have such attention given to their physical, industrial and moral condition, as will diminish the probabilities of their repetition of crime or aid them in the work of reform. While there is limitation of the degree to which the State can accomplish these results, the limit is not so narrow as to be expressed by zero. Indeed, results in other States have shown the great economy of a wise administration of these great interests. These questions are now being studied by able jurists, and statesmen, and statisticians, not in the spirit of a promiscuous philanthropy but on exact social and political investigation. Up to this degree, at least, they cannot but command the attention of every State. How to deal with first sentences, with young criminals, with different classes of crimes; how to promote industry and yet not disturb the proper balance of labor; how to prevent such association of prisoners as shall contaminate and debase; how, in fine, to return the incarcerated to society with the best possibilities of harmless or of useful life, is a problem that no State thinks to ignore; yet, as to it, a State may be in a very inactive or detrimental attitude. In other proper and well-defined limits there should be in each State an oversight both of the physical and social future of the criminal classes. This applies not less to jails than to prisons and penitentiaries. The way that those of both sexes, or of young years, are thrown into the common jails, and the exposures in them both to physical and moral contamination, demand the judicious guardianship of the State. These subjects have received thoughtful attention from some of our legislators and citizens and need to be provided for by proper executive authority and oversight.

To some extent the same is true as to the various almshouse systems of the State, and as to all plans for the care of the indigent. Ill-health, insanitary conditions, pauperism and crime, have relations to each other, very apparent to those who trace, classify and analyze the facts in evidence. No one can visit such an almshouse as that of Hudson county, at Snake Hill, with its 800 inmates, without knowing that it means something more to the State than victuals and clothes and a retreat for the dependent poor. The same is true of other county or city poorhouses, of the numerous township poorhouses of the State, and of other plans of caring for the poor at their own homes or by "farming out."

Pauperism, unless interrupted by well-devised means of improvement, physical, social, educational and moral, does not, under present

systems, tend sufficiently to its own limitation, or to the amelioration of its conditions. These are susceptible of being wisely modified, within those limits which we recognize belong to the State in its care of the population.

Some well-regulated oversight of all these great interests that concern the deranged, the penal and the dependent classes, has seemed so desirable that now the Legislature has, in addition to the general sanitary oversight exercised by this Board, directed a Council of Charities, which will have more especial care of those questions which relate to the economic, social and ethical interests of the State as regards this portion of its constituency.

The State Board of Health has for the past year continued its inquiries into all these various institutions, so far as other and pressing duties would permit.

Our first attention was directed to inquiry or visitation of such institutions as were last year found defective, in order to find out whether suggestions made had been regarded.

In many cases it was very satisfactory to find that careful attention had been given to the suggestions made.

Some of these, while relating to details that do not need to be repeated here, secured valuable improvements in sanitary administration.

Suggestions made as to the Burlington county almshouse and asylum were in part carried out and the ventilation much improved. There is still need of a small hospital or reception building, and of some changes as to a few of the asylum inmates.

In Camden county a single case of typhus fever, which occurred and recovered without extension to others, has showed the wisdom of present isolation methods, and how wise it is to have almshouses arranged and kept with full attention to the details of sanitary and executive management.

The almshouse is now one of the best appointed in the State, and will, probably, after its costly lessons, be kept and maintained with a proper sanitary administration. An excellent and convenient separate hospital has been built.

The asylum is under the management of an efficient matron, and of a physician who, while attending to general practice, has recognized it as a duty to make a special study of alienism.

The size of the asylum, and the more definite provision of a term of office, and a compensation not likely to be disturbed by caprice or

party influence in a sphere into which such influence should not enter, will probably secure for the insane in this institution better provision than in most others.

The condition of the jail and the court house over it, as found in Camden county, has before been reported upon. It served as one of the influences which determined the need of different accommodations. While the Board has not felt called upon to give any judgment as to the expense of outlay, it feels assured that there is a common conviction that a new jail should be provided, and this is rapidly being completed.

In Cumberland county there have been some improvements since the last year. The trustees and the steward are carefully looking into the needs of both the almshouse and the asylum. There are eleven patients in or belonging to the latter. The attendants and nurses in such small asylums often stand in need of more special instruction as to their duties and the methods of skilled attention than they have received.

The jail in Cumberland county had but twelve inmates, and very few suggestions were needed.

In Gloucester county so little was found to suggest the last year, chiefly on account of the small number of inmates, that it was not deemed necessary to repeat the examination this year. All acute cases are at once sent to the asylum.

In the Hudson county institutions, at Snake Hill, some very important changes have been made. The report of the Board, made last year, led to a careful inquiry by the freeholders, and the entire water-closet system has been changed. By it, the sanitary condition is much improved.

There are still many improvements that could be made. These mostly relate to the application of improved methods of dealing with the deranged, the penal and the dependent classes. The system of county care and appointment does not secure or pay for the requisite skilled oversight and treatment. In the case of the paupers and of the large number of children there is no doubt good intent and faithfulness, but many defects, because there is not knowledge of the details now well recognized by authorities and applied in the best appointed institutions. 132 deaths among 750 inmates is a large death-rate, although, with a varying number of admissions, the average number might be stated at 1,000.

The Director-at-Large has an intelligent oversight of all construct-

ive needs, and is glad to superintend changes of which he had felt the need. A laundry, separate from the other buildings, would be a great improvement. A system of separate care of children is desirable.

The appointments of officers are many of them for too short a period. In the asylum, the appointment of ward-keepers should be in the hands of the physician or head steward and matron. While the asylum has many admirable features, it is open to criticism in the male department.

We feel confident that there is among those in charge an increasing inquiry as to methods and as to the way of promoting the best interests of these classes, and of the county and the State to which they belong.

The Passaic county almshouse has a part of it appropriated for asylum purposes. Both it and the almshouse are under one management. The building is well located, and kept in excellent order. All acute cases in the asylum part are sent to the State Asylum. Some questions of more accurate division between the pauper and deranged classes need to be considered. There were thirty-six inmates in the asylum division.

The jail of Passaic county has some of the advantages of newly-constructed buildings, and was, for the most part, in satisfactory sanitary condition. There was so much to complain of in the promiscuous mingling of small boys with those older in years and in crime that the Secretary of the Board called the attention of the proper court thereto.

In Salem county, the jail had only one inmate, and was, as usual, in good sanitary condition, except that objection, as before, was made to a form of closet in use, and to an inadequate and illy-arranged cess-pool method of delivery.

The condition of the almshouse and asylum, as to which previous complaint was made, had been slightly but inadequately improved. Although neither is very large, it continues to illustrate an imperfect system as to the care of paupers and some of the worst features of county insane asylums. The asylum was found to be a system of cell confinement in unskilled hands. The only relief to a sense of sadness mingled with disapproval, was to be found in the fact that the committee whom we met expressed their concurrence in the criticisms and assured the Board that there should be no delay in seeking and effecting important changes. The following communication shows how well they have fulfilled their trust:

"SALEM, N. J., December 6th, 1883.

"*E. M. Hunt, M. D.:*

"DEAR SIR—Your favor of late date to Jos. W. Cooper was handed to me for reply. I have not a copy of your suggestions at hand to answer in rotation, but would say that we have had a number of them carried out.

"The filthy water-closet in the insane department has been thoroughly repaired, and a ventilator carried from the closet and soil-pipe to the chimney. The soil-pipe leading from the building to the stream below has been taken out, and was found to be entirely closed up, nothing having passed through it for a number of years.

"All deposits from the closet have been running along the cellar wall, under it, and into the cellar. This pipe has all been taken out and a cesspool dug in the yard and properly walled and covered up.

"The cellar under the asylum has been thoroughly cleaned up, all filth and rubbish removed and the walls whitewashed. There is now nothing in the cellar but coal.

"The old man with a sore leg has been moved to the top of the building, where he has a good room, with plenty of light and air, much to the comfort of himself and the other inmates. The old colored man has been removed by death.

"Zinc has been put on the floors of a number of the cells. The old zinc was found to be in a very filthy condition. The old commodes have been replaced with new ones, and the slab bedsteads for insane persons on the floor, that you proposed, have been put in. We find they are just the thing needed. Straw beds are put in at night and taken out in the morning. Patients (some of whom had not been on a bed for years) all occupy them every night. Iron doors (grating), with locks on them, have been put in all the cells, so that, if necessary, they can be locked up and yet have a good circulation of air. Also one of the difficulties of keeping the female inmates more private is now overcome. There has been a woman in charge of the insane department for some time, and now everything is kept in much better condition.

"During the warm weather the patients were taken out into the yard (particularly the females) and allowed to stay most of the day. At first they did not want to go, but after awhile they looked for it. I think it was very beneficial to them.

"The pavement around the side door, that you spoke of, has been taken up and a good brick pavement put there.

"The insane department is not yet what we should like to have it, but we have done the best we could with the means at our disposal, so that there is now a very great change in its condition from last spring when you was there.

"The almshouse has also received a share of attention. The water-supply has been improved very much. The spring on the opposite side of the yard has been enlarged and a wind-pump erected that

forces the water to the tanks on the fourth floor. The water-supply is now all that can be asked. The tanks and the room in which they stand have been cleaned, and the tanks have been partitioned off, so that they now stand in a room by themselves, well lighted and ventilated.

"A new range has been put in the kitchen; also a circulating boiler, holding 100 gallons, thus providing plenty of hot water for all purposes. The bath-rooms have both hot and cold water and plenty of it. The quality of the water is good and the quantity all that could be desired. During the dry days of August and September water was plenty. The old gutter from the kitchen to the stream below has been relaid with flat stones and bricks, so that the refuse is all carried off. The stream itself has been cleaned out.

"The out-houses are cleaned every month, and the hogs are not now allowed access to them. And the yards adjoining the houses have not been overlooked. There are other points about the institution that need attention, but the present Board did not feel authorized to lay out any more money just now. We have left them for the next Board.

"It is just here I would call your especial attention, and through you, the attention of the Governor and Legislature, to the manner of conducting the affairs of the almshouse in our county. We are under a special law, which regulates our system of electing almshouse trustees. They are elected for one year only, and when the Board of Freeholders changes, as it often does, they change the trustees of the almshouse, and then a Board of entirely new men comes in at one time, and it is a year before they learn the wants of the institution. Just when they find out what is needed, they have to give way to another new Board. They should be elected for three years, and part of them go out at a time, so that all should not be inexperienced.

"We find it difficult to carry out your suggestion of getting proper persons to take charge of the insane department, as people capable of doing that kind of business do not want to live in an institution like ours.

"I inclose you a copy of the law and regulations governing the almshouse.

"Yours respectfully,

"CHAS. W. CASPER."

We have thus far noticed only those counties in which there are both jails, almshouses and asylums. It has been impossible to visit all the various township and city almshouses, but we have collected some facts as to the modes of dealing with the dependent classes in various localities and as to the causes of pauperism. It is very desirable that the State should more and more realize that it has a direct relationship to the preservation of the people not only from the taxation and expense which dependency causes, but from those greater evils which result from institutional defects. The work already done has been of great service, but much remains to be done.

SCHOOL HYGIENE.

BY JAMES GREEN, PRINCIPAL OF HIGH SCHOOL, LONG BRANCH.

It is not my purpose to attempt to deal solely with the abstract principles of hygiene. If I can but add numerical emphasis to the energetic plans already put in motion, and furnish a little encouragement by the assurance that here is one more who purposes henceforth to fight in this line, I shall feel that I have accomplished all I could expect.

Hygiene is that branch of science which treats of the principles and laws for the preservation of health.

School hygiene involves as much of these laws and principles as are contingent upon the child's attending school. This branch of hygiene is not bounded by the school premises but extends to the domicile of the child: in a certain sense it covers his school-day life. It therefore follows that, while school authorities can only be held entirely responsible for that over which they have absolute control, they are in part responsible for the child's home-life, responsible for so much of it as they may regulate by reaching out with their influence into the home-circle.

The laws of hygiene are not alone physiological, but they are also metaphysical in their nature. If we are materialists, we accept this statement at once. If we are realists, while we pause at the nature of the mysterious chord that unites mind and body, observation teaches us that their union is so complete that whatever depresses the one debilitates the other, and whatever exhilerates the one rejuvenates the other. It therefore appears that methods of teaching have as much to do with the health of the pupil as systems of ventilation, modes of carriage, diet, and physical exercise.

It behooves us, first, to glance at the evils to be guarded against or overcome in the school room; next, to consider the best means of accomplishing these ends.

It is difficult for the unskilled person to trace a large variety of ailments to a common place of either origin or development such as the school room, unless he is impressed with the idea that the body is, as a piece of machinery, one of the parts of which being out of order, the whole is deranged. So, upon any one school room evil, there may be a variety of consequents, through the child's peculiar weakness and special susceptibility.

The prominent evils of the school room may be divided into three classes, named from the diseases they promote, namely: 1. The pulmonary, including the stooped posture, impure air, drafts and sudden changes of temperature. 2. Intestinal, involving irregular meals, hasty eating and hurried stools. 3. Brain and nervous, including over-mental strain, monotonous, or cramped positions, want of sufficient physical exercise and improper light. Now, if we turn to the recent annual report of our Bureau of Vital Statistics, and to the Cyclopædia of the Practice of Medicine, we find the following: Total deaths from certain specified diseases in the State of New Jersey, for the year ending July 1st, 1881, 17,539. Of these, belonging to the pulmonary, are 5,197, or nearly one-third; to the intestinal, 3,943, or about one-quarter; to the brain and nervous, 3,144, or about one-fifth. Total amount belonging to these three classes, 12,284, out of the entire number, 17,539. Add to these figures the fact that, between the ages of six and twenty-one, near-sightedness is increased from 3.5 to 26.78 per cent. in this country, and far more in other countries; and still further add, that the schools have charge of the children at the period when they are most susceptible to these diseases, and we have evidence sufficiently startling to impress us that much must be done, and that right early.

I shall now pursue a course dangerously susceptible to criticism because characterized by specific applications of general principles; but in my judgment specific applications of general principles with criticism are preferable to the practice of some of our writers of using generalities so broad as to be susceptible of greater errors in their application than in their absence. I recently read in one of our leading magazines, three long articles urging the necessity of plenty of physical exercise and not cramming. Now, teachers may have many faults, but I never heard of their opposing physical exercise or favoring cramming. The question is, what is sufficient exercise, or what a proper apportionment of work? It is in answering this question that the mistakes are made.

I wish to prepare some material out of which to construct the main features of a model school room, and to mention in connection therewith some of the special qualifications of an appropriate teacher with a suitable curriculum, and then compare these with what some of us have. I propose that my model structure shall not be merely ideal, but practical, requiring rather increased intelligence than increased expenditure of money.

First, as to ventilation: Each person at each respiration displaces one cubic inch of oxygen by about the same amount of carbonic acid gas and vapor. To admit of this atmospheric change without detriment to health, each person must be supplied with forty cubic feet of air per minute. A room 20x30, with a ceiling twelve feet high, contains 7,200 cubic feet of air. Allowing twelve square feet of floor space per pupil, it will seat fifty pupils and grant each one hundred and forty-four cubic feet of air. Allowing each pupil to use forty cubic feet per minute, it will require 3.6 minutes to use the air of the room. To meet this demand 2,000 cubic feet of fresh air per minute must be admitted into the room. To do this without draft and consistent with maintaining a proper temperature the air should be first warmed and then filtered into the room through ten square feet of aperture, if possible divided into several different mouths, at or near the floor. An equal amount of equally guarded space should be allowed for the exit of impure air. The above figures are a medium between the maximum and minimum as laid down by the best authorities.

The light of the school room should receive careful attention. The following statistics are significant: 62 per cent. of those who graduate from the public schools of Germany are near-sighted; 26.5 per cent. of those who graduate from the public schools of America suffer a like affliction. Between the ages of six and twenty-one this near-sightedness is increased in Germany from 11 to 62 per cent., in America from 3.5 to 26.5 per cent., showing a greater ratio of increase in America than in Germany. Cohn found that of his pupils who studied out of school two hours, 17 per cent. were near-sighted; of those who studied four hours, 29 per cent.; of those who studied six hours, over 40 per cent. were thus afflicted. The eye is probably the most delicate instrument of the nervous system, and as such will most readily sympathize with any bodily deterioration. Of the various causes which aggravate near-sightedness, bad light is doubtless the most serious, and hence should receive most careful attention. The light should be admitted through

plain glass windows near the ceiling, on the left side, and equaling in their entire surface at least one-sixth of the floor space.

Let us next turn our attention to a curriculum. I fear this subject has not hitherto occupied as important a place among our questions of hygiene as the strong sympathy between mind and body, above referred to, would seem to demand. The astonishing fact that everywhere increased study is accompanied by increased physical debility seems to admit of an explanation in one of two ways; either in the increased work or in the manner of doing that work. While I am willing to concede that the hurly-burly, on-rushing, fevered haste in fortune-seeking, quantity-*versus*-quality standard, as tendencies of this new American age in which we live, greatly constrains us to an over-estimation of the amount of work that should be done, yet I incline to the view that we are to find much greater evils in the how than in the how much.

I believe that the courses of study now ordinarily laid down by the more experienced of our high school teachers, are necessary for conformity to the requirements of our most approved definitions of education. These include such a development of the useful faculties of the child as will enable him to go on developing and adapting himself to his environment, and such as are also necessary to meet the actual and just demands of the day. Let us glance at their contents: spelling, reading, writing, grammar, geography, arithmetic, United States history, a brief outline of general history, book-keeping, algebra, geometry, botany, natural philosophy and a foreign language. These units, subjected to a little variation or substitution, as the special case or local circumstances may require, constitute about the usual course.

Now, when we consider the requirements of the average citizen, including as they do a knowledge of such first principles of engineering, drainage, hygiene and civil government as are necessary, through which of the above studies would you draw the pen? But can they be accomplished consistently with the child's time, allowing for sufficient recreation and physical exercise? I believe they can. Here are fourteen branches, the fundamental principles of which are to be acquired, on an average, between the ages of five and sixteen; that is, in eleven years. For some of them more time is allowed, for others less, as the needs may be. Let us glance at arithmetic, acknowledged as one of the most important as well as one of the most difficult. To this branch is given, counting from the lowest primary exercises, a

period each day for from seven to nine years; that is, from 1,400 to 1,800 days. Now, in Robinson's Practical Arithmetic there are about seventy-five different features; thus we have a new feature, on an average, from every eighteen to twenty-four days. Does this seem to be cramming, allowing a proportionately long time to each of the other thirteen branches? I think not, when we remember that our best authorities concede to us time for study and recitation, as follows: During the years from five to seven, two and one-half hours daily; from seven to ten, three and one-half hours; from ten to twelve, four hours, and from twelve to seventeen, five or six hours.

But may not the effects of cramming be produced in a way to which our best educated teachers are most tempted? Is it not best in coming before a pupil or class to impress a new principle, to leave everything else out and present the new principle in the simplest and most forcible manner, holding it before the mind until grasped, and then entirely relax the attention? Not a few prepare the way for the introduction of the new principle by the statement of many conditions or supplementary facts which tend so greatly to detract from distinctness, as not only to produce uncertainty, but also to overload the mental stomach. There is thus a two-fold evil, continuous application instead of relaxation. The mind is overstrained and the nervous system deteriorated, not by how much, but by how.

Again, it is too common to admit to the profession of teaching persons with no knowledge whatever of the natural laws of mental growth. The child is called upon to grapple at once with principles which are the result of the mature thought of our best minds, instead of gradually approaching those principles from the concrete, and thus being prepared for the abstract. The results of all this overloading and overstraining are stunted growth and debilitation. As the same food which, bolted, is a source of great disorder, becomes a source of great strength when properly masticated, at proper intervals and with proper intervening exercise, so with knowledge. As in handling each subject we should proceed from the concrete to the abstract, so in the order of our subjects we should regard the same principle. As the closest application should be followed by the greatest relaxation, our most severe recitations should be followed by the longest recreation, and by those branches requiring least close application. On each page of our tutorial dogmas should be written, "not too much," but in bolder characters should appear, "but how well."

But the teacher is not alone responsible for the cramming effect of

the studies, much is due to the pupils' discipline at home. One of our pupils, who, while subject to the irregularities of home life, considered himself to be working hard, wrote in his first letter after entering upon the course at Annapolis, that he had never before known what work was. He soon, however, under his newly-established systematic habits, became accustomed to the work, did it with ease, and took high honors. The parent and teacher should coöperate in the establishment of systematic habits on the part of the pupil. But look how we disregard the above suggestions in our practice. Our pupils, generally, are kept in school the same amount of time, and given the same number of exercises, without regard to age, physical condition or sex.

Having indicated the proper amount of time to be spent in study and recitation at the respective ages, also the proper mode of teaching, I shall conclude by the statement of a few of the principal conditions of my model school room, and their comparison to what we have.

My model building must be located on a healthy site, and set so that its corners indicate the cardinal points of the compass; must not be set on a closed foundation near the ground, thus converting it into a suction-pump for the ground air, but must have either an open foundation or a cellar; must have the light admitted on the left side through plain glass windows near the ceiling, equaling in surface one-sixth the floor space, and shielded from glare; for the exit of impure air must have sieves set in the wall near the ceiling, and corresponding with perforated bricks or weatherboards, with the perforations dipping down and out; must have the artificially admitted fresh air led through a tube opening above the ground, and, if the building is heated by steam, taken into a drum, surrounded by a coil of steam pipe, and warmed, and thence led into the room; if the building is heated by stoves, the air shall be first led into a sheet-iron drum surrounding the stove, and then filtered into the room. We must have a course of study arranged with reference to the age of the pupil, with pliable rules of absence for girls, and a teacher acquainted with the laws of hygiene and mental growth.

I will now institute a comparison, in four respects, with my model and a few of our leading schools from which I have received partial information:

SCHOOLS.	Time for recitation per day.	Length of recess period.	Cubic feet of air space per pupil.	Mode of ventilation.	Independent of urinals No. of pupils to each water-closet accom.
Model	proportion to age.	proportion to study.	144	sieves or air tubes.	20
Newark H. S.	3⅓ hours.	40 to 60 minutes.	130	windows.	ample.
Jersey City H. S.	4 hours.	40 minutes.	200	windows.	30
New Brunswick	2½ to 3 hours.	proportion to study.	130–500	doors, windo's & Boston sys.	20
Paterson	3⅔ hours.	15 to 30 minutes.	27–107	windows & Rutan system.	40
Long Branch	2½ to 3 hours.	20 to 40 minutes.	130–200	foul-air tubes & windows.	15–50
Hackensack	....	....	....	Rutan.	ample.
Elizabeth	3 hours.	25 minutes.	160	transoms, tubes & windows.	25

The above figures indicate that, while the time devoted to recitation is generally proportioned to the advancement of the pupil, the time of confinement to the school room is uniform, and that modes of ventilation are sadly deficient; and be it observed, that these partial statistics are from our most advanced districts. Our State Superintendent's report says, that only 17 per cent. of the school buildings of the State are provided with some means of ventilation other than doors and windows.

My paper would be incomplete without some suggestions as to how to overcome these difficulties. I offer the following:

1st. Disseminate among our teachers, by some well-organized plan, a knowledge of the applied principles of hygiene and mental science.

2d. Establish the office of State School Architect, to whom all plans for new school buildings shall be submitted, and who would examine all our chief schools as to their sanitary conditions, and report what changes are needed and how they should be made.

I believe that some such plan as this would be popular, for while Boards of Education are desirous for information they have not the time to acquire it. I know of one Board that spent a large amount of money for a philosophical system of ventilation that was as philosophical as trying to pump the air out of a door-yard with a pop-gun.

Let us go on with this well-begun and grand work. There are mountains which, lifting their lofty summits into the skies, catch the first gleams of the morning sun and gradually return them till their reflection lights up the plains below; such is the mission of hygiene.

WHAT IS FEASIBLE FOR THE PROTECTION OF SCHOOLS FROM UNCLEANLINESS AND CONTAGIOUS DISEASES.

BY REV. F. R. BRACE, SUPT. OF SCHOOLS FOR CAMDEN COUNTY.

I. Subjects like the one assigned to this committee are assuming a greater magnitude every day. Populations of cities and towns are increasing rapidly, and with the increase comes the attendant danger from crowding and the evils which necessarily accompany a crowded condition. So long as a fair degree of separation can be maintained, or a sufficient space allotted to each individual, there is but little danger to be apprehended from the evils connected with uncleanliness, but when the populations begin to crowd together and large assemblages are packed in small inclosures, the dangers become so great that the necessity arises to adopt means for the protection of health and life.

The old Jewish code, in its ceremonial requirements, was not only of a religious nature, not merely to keep the people a separate people, but was a grand sanitary set of regulations for the physical well-being. Any kind of uncleanliness, arising from disease, from touching the dead, from touching any diseased or unclean person or thing, made it necessary that the person rendering himself unclean should be immediately separated from all other persons. And, according to the danger from the defilement, he must remain separated a greater or less portion of time. Then came the ablutions, the bathings, the inspections by proper authorities, before admission to the congregation. Well would it be for society to-day, for the preservation of the health of the people, if some of those old regulations could be put in force. With all our knowledge of the great laws that govern life and health, and with all

the advancement in the care of life, we might still learn much from the old Hebrew commonwealth. It was an excellent feature that cleanliness was made part of their religion. I think there can be no doubt that every community, whether it be large or small, has a right to throw around itself all necessary protection to prevent injury to physical well-being. If it be true that an individual has a right to preserve and protect his life, it must be equally true that a collection of individuals has an equal right to do so. Nay, the right of a community is greater than that of an individual, as the injury may be more extensive.

These general principles apply to the communities that we call schools. Let us make specific applications of them.

II. Under the rule laid down that crowding has a tendency to increase the danger from uncleanliness and disease, so that disease can be more easily propagated, if not generated, there ought to be a requirement of law that a certain space should be allowed each pupil, that is, a certain floor space. There should not be any huddling of four, five or more scholars together on one bench, so as to pack as many pupils in the school room as it can be made to hold. That has been done in some districts. It is still done in some districts, I am sorry to say. There is sometimes such a crowding of children, bringing cleanly and uncleanly together and into very close contact, that conditions are created to receive whatever evils arise from uncleanliness. False ideas of economy, ignorance of the common laws of health, or at least gross carelessness with regard to them, lead men to be satisfied with such a condition of things. In an ordinary school room there ought to be allowed for each pupil at least an average of fifteen square feet of floor space. This will give in the ordinary school room, an average of from 150 to 180 cubic feet of air, a quantity which, although seemingly large, will be rendered unfit for breathing in less than half an hour. When the room has the number of pupils that this limit will permit, then the door ought to be closed against the admission of all others. The room, even with the greatest attention and precaution, will become uncleanly from the deposit on desks, and walls, and ceiling and floor, of the worn-out matter thrown off from the lungs, and from the exhalations that will arise from the dirty clothing of some of the pupils. When fifteen square feet of floor space is mentioned as the limit for each pupil, it is not meant that even that limit will entirely prevent the evils from

uncleanliness, but that is the smallest amount of space that ought to be allowed for each pupil.

III. When the proper space is allowed, there ought to be a separate seat for each pupil. As a rule, no two pupils ought to sit together. It is the custom in all our homes in these days to have separate seats for the members of the family. It ought to be the custom in all our school houses to have separate seats for the members of the school. It is more needed in school rooms than in private abodes, because the system of classification according to studies will place together on the same seat children coming from different homes; one, perhaps, with body and clothing in a pure and clean condition, and the other with body and clothing in an impure and unclean condition. Thus, the one whose parents have taken pains to put him in the very best condition to preserve health, is placed in contact with one whose uncleanly condition makes him, if not a generator of disease, a fitting subject for the reception of germs of disease, and this contact is not a passing one, but one that is kept up for several hours of each day, and in a room which has often all the necessary conditions to develop and propagate diseases that are begotten or nourished in uncleanliness.

We have made a great stride forward in the sanitary condition of our school rooms by having them built larger and by removing the old forms and desks from nearly all the school houses and substituting for them the seat that will hold only two persons. We have decreased the danger that arises from placing so many together, but we must go a step further than this, and endeavor to have in all our school rooms desks that will seat only one. This is done in some school rooms already, but generally for the older and more advanced pupils, while the pupils in the primary and secondary departments are obliged to sit two on a seat; and yet it is in these departments where the crowded condition exists, and where, from the young age of the children, there is likely to be the greater amount of uncleanliness.

In the interest of health, of the proper care of the young, of the strength of the future generation, we ought to see to it that such measures as are found promotive of health, shall be adopted in all school districts.

IV. It is necessary for the teacher to see that the room has a regular air bath three or four times a day. Every door and every window ought to be thrown wide open to let the air pour through and carry

off all the foul matter possible. It is astonishing how indifferent to such matters some teachers become. They live every day in rooms that never have a sweep of air through them, rooms whose walls and desks are reeking with the foul matter that has been thrown off from lungs and bodies and clothing, making these rooms dens of uncleanness, bringing their pupils into forbearance with uncleanness and guilty carelessness, the whole being saturated each day with uncleanness. It ought to be required of every teacher that at least once during each session, after the cold weather has set in that requires doors and windows to be closed, perhaps once every hour, the pupils should be made to leave their seats and move around the room, and every door and window be thrown open for a few minutes. It would not chill the room, as walls and floor and desks are all heated, and on the closing of the windows and doors the temperature would soon be restored.

V. Desks soon become very dirty. Hands are necessarily placed on them, hands that are moist, and the dust with the moisture soon forms a coating that a dust-brush or dry cloth will not remove. The heads of the pupils are not very far from the surface of the desks, especially when they are studying and the process of expiration is throwing out used-up matter on these desks, and the process of inspiration is taking in air that has come in contact with these desks, or that has been affected with the insensible exhalations from them, and thus the air that is inhaled is to some degree poisoned. It would be well to have the desks washed with soap and warm water once a week, at all events once every month.

If any one needs convincing of such a requirement, let him examine the desks in any school room after a month's use, and he will easily see that purification by soap and water is a very necessary thing. If he is unable by inspection to see the impurity of the desks, let him try a little warm, clean water and soap, and then inspect the character of the water and see whether the desk did not need cleansing. Attention to such matters as these will produce a very excellent effect upon the pupils. It will lead them to see the value and beauty of cleanliness, and cultivate in them unconsciously a love for the clean, and an abhorrence for the unclean, that will cause them to take better care of their own persons.

VI. In our school law there is no special enactment of the duties of trustees in the matter of sanitary regulations, but full power is

given them to make all rules and regulations for the good of the schools. The thirty-ninth section, second subsection, says: "They shall have power, and it shall be their duty, to make and enforce rules and regulations not in conflict with the general regulations of the State Board of Education for the government of schools, pupils and teachers." This is very comprehensive and is really adequate for all purposes. Under this, rules can be made requiring attention to all sanitary matters. While trustees cannot determine the size of the school house, or, perhaps, the character of the desks, at least in country districts, they can determine how many shall be admitted to the room, and say to the teacher, when so many pupils have been registered, "You must refuse to admit any more." They can require that all pupils shall present themselves in a cleanly condition, and, if they do not, they can refuse them admittance. They can order that no children coming from families where there are contagious diseases, shall be permitted to attend the school.

In Gloucester township, Camden county, the following rules were adopted several years ago, and have worked well:

"Cleanliness in person and neatness in attire are expected from all. A violation of this rule will cause the pupil to be sent home to have the fault remedied.

"No pupil known to be affected with a contagious disease, or coming from a family in which a contagious disease is, shall be allowed in school."

While full authority is conferred upon trustees by the provisions of the law, there are many of them ignorant of the evils of uncleanliness and the danger arising from contagion. They have never given any attention to laws of health, and some of them consider the studies of physiology and hygiene as absolutely unnecessary. Indeed, from the condition of some of the school houses and outhouses one is almost led to believe that some of them consider uncleanliness as promotive of health. After the close of school, in May or June, the school houses are sometimes allowed to remain in their dirty condition all through the summer vacation, and when the teachers enter the houses in the autumn, they find that they are not in a fit condition to receive them or the pupils. The outhouses have also been neglected. The trustees give as their excuse that they have not had time to attend to such things. What shall be done in such cases? It is now left to the discretion and good judgment of trustees as to whether such matters shall be attended to or not. It does seem as though rules and

regulations should be drawn up, by some body having competent authority, for the government and guidance of boards of trustees, rules and regulations in which specific directions shall be given in regard to these all-important matters.

VII. It seems to me that in this and some other respects there is too great a limitation of the authority of the teacher. The teacher ought to be the supreme authority in the school room, and held responsible only for the abuse of that authority. To put one in charge of from twenty to sixty boys and girls and require him to keep them in order, to teach them, not only secular knowledge, but manners and morals, and then tie his hands, is putting him at a great disadvantage. In this matter of cleanliness, I doubt whether a teacher has any authority to send a child home to be cleansed unless a rule is first passed by the board of trustees giving him that authority. He may assume it and require every child to present himself in a cleanly condition, and if any child should attempt to enter the room without having complied with his rule, he might send him home; but, as I said before, it is doubtful whether he has any right to do so. The right to make rules and regulations for the government of pupils is committed to trustees, and yet the very necessities of the case require that the teacher shall have full control in all these matters. It is doubtful whether a teacher has a right to exclude a pupil that comes from a family where a contagious disease exists, unless a rule is first made by the board of trustees. I think that in everything pertaining to the sanitary condition of the school room, to the proper cleanly condition of pupils, the teachers ought to have full control. Especially does it seem right in these days when nearly all our teachers are intelligent men and women. With very few exceptions they have all been taught the subjects of physiology and hygiene, at least so far that they are acquainted with the great general laws of life and health. I think it is not casting any reflection upon members of boards of trustees, either in city or country, to say that teachers are better fitted to judge in these matters than trustees are, for the very reason that the majority of trustees have never paid any attention to such matters and are not called to attend to them every day. This is part of the teacher's daily work, and there is not an hour in the day when something connected with the sanitary condition of the school room, or of the pupils, does not present itself. I am aware that teachers are liable to bring censure upon themselves if they carry out what they believe to be

necessary for the health of the children, in requiring them to present themselves in a cleanly condition, and in preventing their entrance if they are not in that condition, or if they refuse admittance to children coming from families where there are contagious diseases. We are all apt to be found fault with if we attempt to perform duties that necessarily spring out of our positions, and yet our responsibility requires that we have the power to meet that responsibility.

VIII. The State Board of Education of this State have power to prescribe and cause to be enforced all rules and regulations necessary for carrying into effect the school laws of this State. Whether this gives them power to prescribe size of buildings, site of buildings, seating accommodation, character of seats, sanitary regulations for the government of trustees, teachers and pupils, may be a matter of dispute. My own opinion is that it does. General rules for the government of all schools, coming from this highest school authority, would be treated with great respect. Already a rule has been made that county superintendents shall note the condition of school houses and outbuildings. This is in accordance with the section of the school law that requires each county superintendent to report to the State superintendent any and all facts within his purview which touch and describe the location and capacity of each school healthfully to accommodate the pupils in attendance, to the end that] a full observation may be deduced, favorable or otherwise, as to an ample supply of sittings, suitability of conveniences, eligibility of position, attention to ventilation, and as to all such other pertinent subjects as may clearly and fully exhibit the sanitary condition of the public schools under his official inspection. This gives no authority to the county superintendent to determine anything in these matters. All that he is empowered to do is to inspect and report. But if the law requires that these matters be reported, by inference, at least, it gives the power to the body to which the report is made to make rules and regulations with regard to the matter reported. Then if rules should be made by the State Board of Education determining what is healthful accommodation and what is detrimental to this healthful condition, it would become the duty of the county superintendent to see that such rules were observed.

It seems to me, then, that under our present law we have the means for protecting the children in our schools from anything that may

prove injurious to health, although the local authorities that have the power seldom use it.

Let me now put in brief the points made:

1. A crowded condition of school rooms makes the danger from uncleanliness greater.

2. At least an average floor space of fifteen square feet should be allowed to each pupil.

3. When the number allowed by this limit is reached, no more pupils should be admitted to the room.

4. There ought to be a separate seat for each pupil.

5. The room ought to have a regular air bath once every hour during the day, every door and window being thrown open for two or three minutes.

6. The surface of desks should be washed every week with soap and warm water; at least once a month.

7. Trustees have the power to make rules for the government of schools in sanitary matters, but they frequently forget to make them.

8. Teachers have not the authority. It would be well if they had larger powers in these matters. They ought to have the power to send any child home that presents himself in an uncleanly condition, or that comes from a family where a contagious disease exists.

9. As many trustees are ignorant of laws of health, or careless in making rules for the protection of the health of the pupils, it would be well for the State Board of Education to make such rules. If that authority is not invested in the State Board of Education, then it would be well for the State Board of Health to make them.

ABSTRACTS FROM ADDRESSES AND PAPERS OF THE NEW JERSEY SANITARY ASSOCIATION.

The second report of this Board (1878) contained an outline of and abstract from the annual meetings of the New Jersey Sanitary Association to that date. Five meetings of the Association have been held since, viz., the fifth, at the State Normal School, Trenton, in December, 1879; the sixth, at Elizabeth, December, 1880; the seventh, at Rutgers College, New Brunswick, December, 1881, and the eighth and the ninth, at the State House, Trenton, December, 1882 and 1883. As there is no printed volume of the transactions of this Association, it is of permanent service to our citizens to make brief notices and abstracts of the papers presented or the discussions which arise.

Dr. J. L. Bodine, the President of the Association in 1879, after giving various reasons why sanitary science and art should receive attention, showed why this study was impossible until physiology, chemistry, geometry and kindred subjects had been pursued, as also why it is that even yet our knowledge is so imperfect:

"Modern sanitary science, or public hygiene, is a development of the present generation, and it is coincident with the advancement of knowledge and improvement in the social condition of the dwellers in civilized communities. The Irish famine, with its large mortality from fever, scurvy and starvation, the various epidemics in recent times of cholera, diphtheria and yellow fever, the great waste of life in the Crimean and our civil war, the systematic study and registry of vital statistics, the investigations into the causation of various diseases and the conditions under which they arise and spread, and many other social influences, have powerfully aided in its development, and have caused it to be the subject of the hour—the subject for discussion and illustration in our daily press and in our popular magazines. Sanitary progress was possible, and some of the greatest triumphs of knowledge in the direction of disease-prevention really did take place in an age before ours. Edward Jenner, in the last century, as a result

of the patient observation and interpretation of a neglected fact, did show how that most contagious, loathsome, fatal and disfiguring disease, small-pox, could be stamped out by the protective influence of an artificial disease communicated by the process of vaccination; and John Howard, that greatest of philanthropists, by intelligent, self-denying and persistent labor in the accumulation and presentation to the public of the facts of the management of jails and prisons, caused the disappearance of the jail distemper and the black assizes, and so promoted prison reform that it has become the fact, a well-managed modern prison—by its cleanliness, by its equable temperature, by its ventilation, by its abundant water-supply, by its speedy removal of all excreted and refuse material, by the discipline of its occupants, by their regular hours of labor and rest, by their plain, yet sufficient diet, by their protection from changes of the weather, by their deprivation of artificial stimulants, and by their constant medical supervision, so that the beginnings of disease are prevented or treated—has become an exceptionally healthy institution."

Some of the contributions to sanitary science were then noticed:

"Of the contributions to sanitary progress, in modern times, probably no single one has been so fruitful as the discovery of vaccination by Edward Jenner, and none illustrating more clearly Christian charity and self-denying labor for others than the work of John Howard, but modern sanitary science has done much towards improving the knowledge of external conditions and surroundings in their influence upon the health and mental and moral welfare of men. It has traced the causes of diseases and the conditions under which they arise. By the aid of chemistry, and the microscope and other instruments of precision, it has shown the relations of healthy and diseased structure, the adulterations of food and the amount and kind of impurities in air and water, with their results. It has shown the relations between the ground atmosphere and disease, or, in other words, the results of the impregnation of the ground around and below human habitations with organic refuse and impurities. It has established the casual relation between a damp soil and consumption, neuralgia, rheumatism and catarrh. It has shown that drinking-water and the supply of milk may become vehicles for the transmission of the material poison of the contagious diseases. It has studied the subject of physical training, in relation to health; the methods of school management and discipline, and the kind, variety and number of school studies in their relation to mental and physical development. It has investigated the relations of heredity, training and environment to the great social evils, crime and insanity. It has shown the effect of occupation upon health and has demonstrated that by overcrowding and defective ventilation the air of workshops and factories may be made such that pulmonary diseases appear to spread from one to another.

"The earthenware manufacturer, or potter, occupies a low place in expectation of life, being below the glass manufacturer, the tool, saw and file-maker, the hatter and the needle-maker, and dying at the same rate as the inn and hotel-keeper. The occupation of the potter is by no means a healthy one. The atmosphere of a pottery is filled with minute particles of quartz and clay, which are by the respiratory act drawn into the lungs, producing, by their presence, irritation, and, in time, structural disease of the lungs. The mould-makers, who work with insoluble plaster of Paris, suffer equally with the working potters from lung disease, and the kilnmen's work is heavy and of such a character as to subject them to extreme alternations of temperature, and especially liable to rheumatic and catarrhal attacks. The dippers and some others of the operatives suffer from the poisoning of lead. Another source of bad health among the potters is the excessive use of stimulants which prevails among them; but their desire for and use of stimulants may be a result of impaired health as well as a source of continuous impairment of health. I have a decided impression, as a result of considerable experience in attending upon the families of working potters in Trenton, and from such information as careful inquiries have secured from them, that pottery operatives in this country are in better health and longer lived than in England. Our climate is drier; the workshops are new; more work is done by machinery. The lighting and ventilation of the workshops are really attended to, although indefinite improvements in the direction of cleanliness and the supply of pure and dustless air to them are possible."

The question as to the specific origin of typhoid fever was referred to, as advocated by Dr. William Budd, Prof. Tyndall and Sir Thomas Watson; while Dr. Murchisen, Sir William Jenner, Dr. Bastian and others insist that it may be developed as well as propagated by certain filth conditions.

The chemical analysis of air and water has not yet informed us as accurately and exactly as we could wish as to other sanitary conditions. Important statements were made as to the sanitary defects of Trenton.

Among the available paths for future sanitary progress, the address notices the powerful influence of heredity in the development of scrofula, cancer, consumption, rheumatism, gout and various neuroses; the influence of school life on sight and figure, and the social and financial as well as sanitary importance of a closer study of the prevention of insanity. "Our hopes for sanitary progress are the common hopes of humanity for more perfect light and wisdom; we need, for the fulfillment of our hopes, the coöperation of all men who believe that disease is a physical, a social and a moral evil, and therefore

worthy of efforts for its prevention." The subjects under consideration at this meeting were: "The Relations of Soil and Drainage to Death-rate in Jersey City, Hoboken and Paterson;" "The Sanitary Regulation of Schools;" "The True Sphere of Sanitary Laws," and "Sanitary Reform in the Smaller Towns."

The report on the drainage and death-rate of Jersey City was ably presented by L. B. Ward, C.E., E. W. Harrison, C.E., Arthur Speilman, C.E., and Charles P. Brush, C.E., with a report on the drainage of Paterson by J. S. Hilton, C.E. These reports embraced careful details as to the needs of drainage and the actual conditions of the most populous parts of Hudson county and the city of Paterson. The interest elicited was such as to attract the attention of the National Board of Health, as well as of the State Board of New Jersey. The facts revealed, as to the condition of parts of Hudson county, seemed to make it proper that in the interests of commerce there should be still further inquiry into a locality that had an extended water front, and was adjacent to the most important harbor of the country. This led the National Board of Health to make a special appropriation of $1,000 for more extended surveys and maps. The work was done under the oversight of the New Jersey State Board of Health, and, after the approval of the Board, the whole amount was paid to the local engineers and officers employed. The results are already on record, in part, in the first report of the National Board, 1879, and in the report of this Board, 1880, pages 48–63, while so much of the report as relates to Jersey City is on file in this office. As these reports are already accessible in print, we need not abstract here, but only refer to the important aid furnished to the work by the preliminary efforts of this association.

In a paper with regard to the sanitary regulation of schools, with special reference to the control of infectious diseases, Dr. H. A. Hopper, of Hackensack, urged the relation which all public and private schools bear to the extension or limitation of disease. We present the following abstracts from this paper:

"The limitation of the spread of contagious and infective diseases, whenever they make their appearance in any community, is, and will always be, a matter of deep concern to the sanitarian, and this concern must extend to a desire for their entire suppression. Most particularly when it involves the safety of a class of our population, whose tender years and helpless dependence appeal strongly to the guardianship of parental affection and through it to a publicly-applied hygienic philanthropy.

"In the midst of our boasted improvements in sanitary plumbing and our knowledge of preventable disease, we find that in many city school buildings exhalations from badly-ventilated and worse-washed water-closets, as well as from entirely unventilated soil-pipes, are constantly permeating the class rooms. Inspection will bring almost daily proof that the ground floors appropriated for recess enjoyment are almost entirely shut in from the open vaulted sky above, and thus from the true source of pure air. This multiplies the avenues of enervation, and constantly defeats the noble design for which such places were instituted—the replenishing of wasted physical force.

"The country school house is amenable to as severe criticism for its defective appointments and surroundings. Such establishments can, with very few exceptions, boast of the convenience of their privy vaults in close proximity to the school building, their contents very rarely removed, sending up the gaseous products of organic decomposition, which are wafted by favoring winds through open windows to regale the nostrils of patient—because disciplined—inmates, and scatter the seeds of disease among them. In this connection it is no uncommon discovery to find such privy vaults with uncemeted bottoms, in loose, gravelly soils, percolating their liquid contents through subterranean streams to reach the nearest well or spring from which the potable water-supply is derived to meet the thirsty demands of the teacher's wards.

"On account of these and other multiplying facts, quite as important, the subject of sanitation in connection with school management addresses itself with peculiar force to the consideration of the thoughtful in every community.

"In order to deal practically, instead of theoretically, with the subject, we propose to present a few tabulated statistics, as a basis for the suggestions which are herein made, for the consideration of this association. The mortality rates of early life, growing out of infectious and contagious factors, it will be found, are so large as to become seriously suggestive to the sanitarian, and should prompt investigation for the discovery of the possible, and probably fruitful, sources of them, and at the same time lead to the most earnest inquiry for the best means to be employed for their abatement.

"By consulting the *Bulletin of Public Health*, we find that the following average monthly data since April, 1879, present a table of no small proportions in illustration of the whole subject.

"Tabulated reports from twenty-three towns and cities, representing nearly every section of our country, and including a population of 6,000,000 souls, exhibit more or less perfectly the monthly death-rate:

Scarlet fever	440
Diphtheria	400
Measles	200
Whooping cough	124
Total	1,164

"If we multiply these figures to represent the annual mortuary account, we will have, in a population of 6,000,000, nearly 14,000 deaths from diseases incident to early life, of the contagious and infectious type alone. This death-rate, we must bear in mind, does not represent the true number of cases of disease of the class just named; but for a more satisfactory presentation of the number of cases occurring, we may refer to the statistics of the city of New York, with a system of Health Board and vital statistics as nearly perfect as is practicable, and reach an approximation to the truth, which can be made applicable to our own city and village population so nearly, that we will not fail seriously in reaching a conclusion as to their importance, and the duty of the State to her citizens, to provide some relief, by the direct or indirect appointment of local Boards with authority suited to local necessities, for the removal or stamping out of the causes of at least some of our infectious and contagious diseases. For the five months inclusive, from July 1st to November 26th, 1879, we find reported by the city authorities the following number of cases:

	Scarlet Fever.	Diphtheria.	Measles.
July	236	92	80
August	305	140	218
September	331	173	89
October	135	117	119
November	162	151	316
Total	1,169	673	822

"In one city, therefore, we have a report of no less than 2,664 cases in five months, of that class of diseases alone which are peculiarly liable to occur in early life, and hence probably largely affecting those likely to be found in schools, both public and private. This, too, in a city where the untiring industry of its health officers aided materially by school authorities, has been to a considerable extent successful in its mission, and such labors give promise of greater future usefulness. It is to be regretted that our own system has not yet reached a point of perfectness adequate to the recording of all cases of disease with the same exactness as our death record, and cannot, therefore, be resorted to and made available for exact statistical record, but our death-rate warrants the conclusion that our largest cities and smaller towns will not, in the aggregate, fall anything short of the above, in proportion to their populations.

"It is not claimed that, in these figures, we have reached a point of exactness, but one of probable approximation, which is more likely to be seriously increased than pleasantly diminished, if the whole could be obtained. In the absence of any records on this subject, connected with school management, we are unable to say how much of infectious spreading may have been due to carelessness or entire disregard to the danger of converting endemic into epidemic increase of malignant disease, both on the part of school authorities and private families. It

has too frequently happened that indifference in this matter has spread death, dismay and domestic distress, together with pecuniary loss, to individual families and whole communities.

"Where no legal restraint has been imposed, the experience of every observer records the fact that children who have been detained from school by illness, for even a short time, have been hurried back to studies often by foolish ambition to recover lost positions in their classes, and in many cases to remove them from the irksome care of domestic supervision, the germs of disease being carried with them in the clothing worn, or, as in scarlet fever, by means of the desquamating cuticle adhering to the person. For the correction of this evil, we ask for authority with legal power to enforce it in every hamlet and school in the State.

"Pertinent to this matter is the consideration of an apparent indifference to danger in our day, which has frequently made our halls of learning pestiferous propagators of disease and death. For the truth of this statement the testimony of scores of observers stands pledged. We need not spend time in multiplying illustrations when we can turn to the report of our own State Board of Health concerning the Jamesburg disaster, which was of very recent occurrence. In pursuing this study, let us profit by the lesson taught in the investigation made by that industrious sanitarian, Dr. E. Harris, into the causes of a fearful scourge, which sent death and dismay into the homes of no less than twenty families in the township of Newark, Vermont, last spring, through the district school, and by means of only two pupils, carelessly and too early returned to the school after an attack of diphtheria. The investigation tells us that from so insignificant an origin, of ninety-two persons residing in the families affected, forty-eight suffered with the disease. If healthfulness of natural locality could contribute anything to prevent such an issue, we can find it there. The doctor tells us that 'although located amidst the steep hills of Vermont, in one of the most salubrious regions, where the annual death-rate seldom exceeds fifteen in the thousand living inhabitants, and where nature proffers the purest air and water, with ample nourishment and separateness of families, are witnessed the combination and progress of the causes which enter into the most rapid and destructive propagation of malignant disease;' nor are we informed that by the law of natural selection the disease weeded out only the feeble and left a more vigorous race to populate the desolate region. More probable is it that in many cases some organic lesion is still telling the story of wasted physical power baffling the best scientific skill."

A valuable paper on "The Domain of Sanitary Legislation," by E. S. Atwater, of Elizabeth, which was read at this meeting, has since been published in the report of this Board.

In a paper on "What has been Done and what Neglected as to

Sanitary Reform in the Oranges, Bloomfield and Montclair," J. C. Bayles, C.E., editor of the *Iron Age*, detailed various efforts that had been made to remedy evils arising from the disposal of excretions and garbage, from the absence of a sewer system, and from the need of a more reliable water-supply.

It is believed that this paper, together with other local efforts, has contributed much to awaken the attention of the citizens of these districts to their sanitary necessities, some of which have since been well provided for.

At the next annual meeting, held at Elizabeth, the address of the President, L. B. Ward, C.E., of Jersey City, was a historical survey of the progress of sanitary science and legislation abroad and in this country. He gave a clear and exhaustive history of sanitary legislation in England, which we have not space to reproduce. It regulated streets and buildings, the water-supply, sewerage, drainage, sewage utilization, nuisances, adulteration of articles of food and drink, analyzation of food, and penalties for adulteration and other matters of a similar character. From time to time, various acts were passed touching these matters with ever-widening authority, until there has grown up a vast sanitary system, the details of which will bear the most careful examination and application here, as far as our circumstances will permit.

The President then dwelt upon the importance of the National Board of Health work, which owes its existence to the yellow fever epidemic. Sanitary administration in this country is still in its infancy, and its object has hitherto been principally to collect information for future deductions, and local Boards are clothed with little more than police powers. But governmental powers should be expansive and progressive in this respect, and reference was here made to the varied and progressive experience of England in the application of sanitary laws. This legislation was influenced by and began with three outbreaks of cholera, which led to investigations of the means of preventing or mitigating infectious diseases.

The early work of Massachusetts was then traced and its valuable relations to the progress of sanitation shown. Also, the history of our own State Board was outlined, and its work reviewed and commended.

In addition, the special work of the Bureau of Vital Statistics was alluded to. As to the death-rate, except in Hudson county, Paterson and Newark, nothing certain was known in regard to it, previous to

the passage of the existing law. Returns of births, marriages and deaths were generally very loosely made. Under the present law, the returns of vital statistics are made to a competent officer, who shall examine them carefully and prepare the proper tabulated statements as to the causes and sources of death, sources of social progress and deterioration, and report annually to the State Board of Health, which reports shall be published as part of the report of the Board. By this means, the reports of deaths are now believed to be practically correct.

Mr. Ward next dwelt upon the sources of water-supply in the northern part of the State, and thought that the establishment of private water companies should be fenced around with proper safeguards and restrictions. Among the powers which the Legislature must intrust to local authorities is that of borrowing money on the security of local resources, for the construction of works necessary for the public health or desirable for the advancement of the community. As he had given personal attention to a study of the water-sheds of the State, his remarks on the subject were of much value.

In addition to the matters discussed in this address, the inspection of buildings, the subsoil drainage of cities and towns, the examination of wells and control of their use in cities, the diseases of animals in their relation to human diseases, and drainage for health and the power to condemn lands for this purpose, were the topics which came up for consideration.

As to the inspection of buildings, reports were made as follows:

J. C. Bayles, of Orange, among other things, said: In making a thorough inspection of a house, let us begin with the cellar. It needs to be dry and clean to be safe. Not many cellars in city houses have perfect drainage and ventilation, and such as have not should be given a thorough cleaning. The main drain, leading to the sewer, should be iron, extending at least through the basement wall, and the outlet should be free and the pipe without leakage, else it causes dangerous saturation of the soil. Next in importance is the soil-pipe, which rises vertically from the cellar. Each joint should be inspected, and it will do no harm to call in a plumber to your assistance. It should be condemned when not found tight, or when not carried through the roof. The fixtures of the closets are often the cause of great trouble, and he would condemn all the closets that are built in small pantries that have no ventilation, and open only into a hall or bed-room. The custom is to waste baths and basins into the nearest closet traps, but such traps are what their names designate.

There should be vent for every trap in the shape of an air-pipe, and with this vent and an open air-pipe there is no danger from closets in houses. All the branch wastes need looking after, and it is better to give them a vertical waste-pipe of their own. Slop hoppers on the upper floors, though seemingly necessary, are causes of trouble, and should be flushed out.

Some additional points were presented by Prof. Jacob Cooper, of New Brunswick: His subject was, "The Proper Sanitary Conditions of Buildings in the Country." In treating it, he said he would consider, first, the natural location; second, the interior structure; third, the artificial surroundings. Level plains are less likely to be healthy than undulating country. The house should front the south, and be located west or south of a public road, on a slope, yet not at the bottom of a hill. Drainage is a prime condition of health. The well should be a little higher than the house, and the sewers should be carried far away. No sane person will construct a cesspool in the vicinity of any building for man or beast. Natural forests should be on the northwest, north and northeast, but no trees very near the house on either side, and no sunlight should be cut off. Regard should always be had to sunlight, and the kitchen should be toward the sun, while the parlor and spare rooms, less used, should be on the north side. The internal structure of the house should compass drainage and ventilation. It is hard to fight against nature; water-closets should never be in the house, but in an addition, not opening in it nor in connection with it, but reached by a covered way, and should be such as can be disinfected all the time. The contents should not pass into a subterranean drain. Such closets do no harm and do much good. The bath may be in the house but not in the water-closet, and though it is not so convenient to have the closets outside, the annoyance is in no proportion to danger of having them in the house.

Ventilation in the country presents but few difficulties. There should be in every room a fire-place, whatever the means of heating the room. It is worth more than any other method, and an open fire, by blaze of wood or the coals of fire, causes the circulation of the air to be perfect. It is the most simple system devised. In reference to cellars, Professor Cooper said they needed more precaution than care. They are not to be used for all the vegetables of the farm, nor for more than are needed for the present, for the evaporation is disagreeable and dangerous when they begin to decay. The dish-water and other waste water of the kitchen can be used to feed grape vines,

which are proverbially hungry. The outbuildings intended to house cattle of every kind should be at the east or north of the dwelling, so that the prevailing winds, which are from the west and south, would blow the odors away from the house. They should not be close to the dwelling, not less than 300 feet, and on sloping ground. No standing water should be permitted in or about them. Liquid manure should not be left in the center of the yard, but should be led away and taken up by muck or some other absorbent. The floors of the stables should be inclined, so that they could be constantly drained off, and all the outbuildings should be lower than the surface of the water in the spring or well. All animals require pure air and should not be crowded closely in stables where there is not free circulation. Even the pig-pen and the hennery should be well cleaned and ventilated, and no animal should be fed with spoiled food.

Prof. H. B. Cornwall, of Princeton, next spoke on the same general subject:

Cellars, he said, should be well ventilated and dry. We may presume we have a good cellar if the bottom is clean, yet he gave an instance of sickness in three houses that were built over a place upon which a privy had stood, but which had been cleaned out, filled in with new earth to the depth of six or eight feet, and a coating, four inches thick, of cement placed over that, on the bottom of a cellar. Yet ammonia was formed in that soil in large quantities. The drainage should be good, but the question in the country is, What shall we do with it? The easiest way to get rid of all the drainage of a house is to run it off to a cesspool. There are certain circumstances where that may be allowed. If we have a large lot, the soil gravelly, not sandy, extending fifteen or twenty feet, or more, and then striking a sound rock, under such conditions, a cesspool 75 or 100 feet from a house, and a well and a properly-ventilated connecting pipe, leave very little risk. The danger is in a sandy soil, or where it beds on a seamed rock, where it is traversed or seamed by vertical joints that are apt to be open. These carry the water anywhere. They have been known to carry the drainage seventy-five feet to a well. In the towns where lots are small, where they empty out in fissured rocks, or where they meet clay, they will not do; and the question in cities, What are we to do with our sewage? is one of much importance. There are two ways, other than running it off with water. They are, first, to let it run over the ground; second, where the lot will permit it (where the water does not contain fœcal matter), use subsoil irrigation. It is

expensive, but there are numerous books to show us how to do it. The earth-closet will serve the purpose if well taken care of.

Prof. Cornwall referred at length to well-water, and analyzed it, with a view to finding causes for typhoid fevers and malaria. He questioned if there was any direct connection with water and malaria, never having heard of a case where chemically pure water ever caused malarial fever.

For a water-supply in the country, dig a well—and an open well; protect it by a cemented well, six or eight feet below the soil; fix the surface higher than the land around, so that rain-water can't flow into it; and when contamination is discovered, remove the cause. It is not necessary to do more, as the well will generally do the rest itself, in time. The cistern water-supply is best in a small town. It is free from privy contamination, and a well can't be depended upon in this connection. An old shingle roof is good, but a slate roof is best, to gather water from; but do not use the water of any rain-fall that does not thoroughly cleanse the roof. The water will be very soft, but as pure as can be. It should be thoroughly cleaned out at least twice a year. A newly-cemented cistern will give hard water, but it will cure itself in time. Filters—there are cases where they are good, but they should not be relied upon, as they become so impure that if you put perfectly pure water in it, it will come out impure. The distribution of water through a house should be through iron pipe. Pure lead pipes are not good, for, though spring-water does not long affect them, rain-water will continue to act on them as long as used.

The paper of Ashbel Welch, C.E., on "Subsoil Drainage," has since been published in one of our reports.

Dr. H. A. Hopper, in a paper on the "Sanitary Examination of Wells, and How to Control Their Use," emphasized the dangers to public health arising from the use of impure water, and claimed for the public a control over all sources of water-supply. This paper has an important practical bearing upon questions constantly recurring, and so is given with but slight abbreviation:

"First among the facts we present is the commonly accepted truth that the quality of water is fixed by the character of the soil through which it percolates. It may hold in solution or suspension a large amount of mineral or earthy matter. It may be alkaline or contain the salts of iron alumina, silica or even chloride of sodium. It may contain ammonia or phosphates derivable from the soil constituents, or, as in the case of ammonia derived from the atmosphere, descend-

ing with the rains, and be free from deleterious influences; but much of the dangerous combination which may be found in solution must depend upon the source of derivation of the water. Ammonia—harmless when derived from rain-falls—often is the result of organic decomposition, and when associated with the organic substances from which it has been evolved, becomes a dangerous constituent of the water in which it is held. Such organic impurities in water challenge the closest scrutiny, and require investigation to discover their sources. Although ammonia and nitrogen in a free condition, as may be inferred from the preceding statements, may be entirely innocuous, in some of their combinations they do become dangerously toxic in their influence upon the human organism. Water, by its solvent power, is capable of holding in solution, to some extent, at least, whatever comes in contact with it; rain and snow as they descend through the air carry with them particles of dust mingled with the germs of animals and plants, which, under favoring seasons and atmospheric conditions, may multiply and die, and thus become sources of putrescence and of that chemical change known as organic decomposition. In some localities open wells are largely supplied from hillside springs, whose streams run through low, marshy fens, and carry, with very little filtering through the soil, the products of such decomposition; but with this source of contamination we shall deal less in this report than those larger and more decidedly prevalent reservoirs of pollution which abound in thickly populated districts. Professor Chandler, of New York, asserts that as an impurity in water is almost always present, we have organic matter whose exact chemical character has not been fully determined. This, he says, is a collective term for a great many different substances derived from decomposing vegetable and animal matters. Although we may be at present reduced to admissions of defects by reason of the imperfect demonstration of some of our scientific problems, practical familiarity with the deplorable results of the neglected warnings scientifically given, concerning the dangers to health and life, from the unconsidered sources of our well-water supplies, should demand a larger share of our daily investigation than is usually accorded to them. Treatises almost exhaustive of this subject have come from prolific pens to a very large extent, and still the demand for agitation of its life-saving truths are continually made upon the teachers of social science problems. Frankland, Letheby and others abroad; Chandler in the papers of the American Public Health Association, Jules Lefort in the *American Chemist*, and Professor H. B. Cornwall, of Princeton, N. J., and Dr. Pinkham, of Montclair, N. J., before this Association, have so carefully discussed the present and prospective of its influence on the lives and health of communities, that the literature of the subject is so full it appears to be just now a supererogation to attempt to add anything beside some practical observations for personal use and the guidance of Health Boards in the discharge of their duties

to the people, for whose safety they hold their appointments. First in the series stands the necessity of a careful examination of the surface surroundings of any given well requiring examination. Next to this an investigation of the character of the soil strata and depth from which it is derived. Of the first it may readily be understood that the duty of the careful sanitarian covers a wide field, in which he is likely to encounter hereditary prejudice, domestic convenience, and too often the cherished plans of the enlightened (?) architect; and it not infrequently happens that limited ground area seems to demand certain relations between the dwelling, well and privy vault. In every case where those relations are inconsistent with the strictest rules of sanitary propriety, a decided judgment, based upon hygienic considerations, should be expressed in terms not to be readily misunderstood. The examination of the local surroundings of wells includes suggestively a review of some of the practical literature of the subject, and it will not be amiss at this point of its consideration to refer to reports and opinions in confirmation of its necessity. Prof. Chandler, in his report published among the papers of the American Public Health Association, says: 'In many cases, from the proximity of cesspools and privy vaults, the water becomes contaminated with filtered sewage matters which, while they hardly affect the taste or smell of the water, have, nevertheless, the power to create the most deadly disturbances in the persons who use the waters. In the neighborhood of grave-yards the water of wells is often impregnated with animal matters from recently-filled graves.' The popular and widespread belief that to effectually 'dispose of decomposing organic matter, it is only necessary to remove it from sight by burial in the earth,' is founded, no doubt, upon a half intelligent trust in the power of the soil to retain or neutralize in some way, all organic matter from solutions. This has begotten an indifference to the subject of soil saturation and filtration. As a result, the wells in many large cities, as well as those of extensive rural districts, are receiving pollution from privy vaults, cesspools, cattle-yards, and even cemeteries. Strange as this may sound to the intelligent investigator of to-day, its proof abounds in every direction. Dr. Vaughan, of the University of Michigan, in a paper read before the Sanitary Convention of Detroit, this year, January 7th, 1880, says: 'During the past three months the authorities of a growing village in the interior of this State have, in spite of the remonstrances of many citizens, located a cemetery within a few rods of a deep well, the water of which is used for household purposes.' That the danger of such practices has been for a long time appreciated by careful observers, needs no special proof, notwithstanding the present widespread indifference. In an article by Jules Lefort, in *American Chemist*, Vol. II., page 448, he declares that 'as long ago as 1808 it was decreed in France that no one should dig a well within one hundred metres (about 330 feet) of any cemetery.'

"In our presentation of the branch of investigation covering sur-

face surroundings, we include necessarily some of the serious results of its neglect. A few examples of such results are of value for a demonstration of fact above the fallacy of conjecture. Sudden outbreaks of disease, sometimes of a gastro-enteric type, and at others of a purely typho-malarial fever, often follow the unsuspected ingress of sewage matter into the well, either from leakage from soil-pipes, cesspools and other contaminating sources, and more frequently by gradual percolation than by sudden irruption. From such a source, at a convent in Munich, thirty-one out of one hundred inmates were affected with typhoid fever. At Pittsfield, Mass., a large number of pupils in a boarding school for young ladies were similarly affected. The history of the case given recently by Professor Cornwall, as having occurred near Princeton, N. J., of the colored man whose typhoid disease was communicated to a number of others through the use of well-water, is too familiar to you all to need recapitulation. What shall we say of the late calamity which befell our ancient seat of learning at the city just named, where modern vigilance failed to discover those surface surroundings which should have averted the cause thereof. The force of this reflection is not diminished by the consideration whether or not it may have happened in part from poisoned atmosphere in conjunction with polluted well-water, but it presents the fact as its own unpleasant commentary. It is not necessary to multiply examples of this kind by a recitation of dozens of cases which have been reported in our own and neighboring States; but it is well to bear in mind an important practical fact pretty well conceded by nearly all scientists, that water once contaminated by sewage, especially that containing the detritus of certain diseases, may communicate those diseases after an apparently thorough purification. Professor Cornwall, in his paper published in the second report of our State Board of Health, says 'that it is not possible, within certain limits, to say how long a dangerous water will continue to be dangerous; still, analysis very often serves to detect danger where it was hitherto unsuspected.'

"We are quite safe in concluding that this view of the matter in its relation to well-water is entirely correct, and not subject to those restrictions placed upon the views of scientific experts, who, like Dr. Frankland, conclude that all waters once contaminated by sewage poison are never afterward fit for use; while Dr. Letheby, Dr. Miller, Dr. Parkes and others insist that waters of open streams do purify themselves after the processes of passing along several miles subjected to oxidation, fish feeding, &c., and become entirely pure. This point is made with special reference to the control of well-water used in cities. In regard to the next consideration named—the depth and soil strata through which the well may be obtained—we are likely again to meet with popular delusions which have been largely fostered and developed by the teachings of well-informed *quasi*-experts. Chief among these errors is the idea that a rocky bottom, particularly

one with drilled holes to reach a water-supply, must be exceptionally safe from surface contamination; putting out of mind an important factor which may make such wells exceptionally unsafe—we allude to the possibility not only, but in our own State to the probability, that the perpendicular fissures and longitudinal or horizontal and irregular strata seams of sandstone, shale and even trap-rock formations, may afford a more direct conduit for unfiltered sewage, than a compact, loamy soil. It is no less important that the idea of perfect safety attached to driven wells should receive a check by explaining the term as only relative. Cleanliness from direct surface wash is well secured by that kind of water-supply, but in all other respects it is subject to the same regulations and restrictions to be applied to the stone-built or cement tile-pipe well. What influence is exerted by different soils in the removal of sewage contaminations for the protection of well-water from pollution? This is eminently a practical question and must sooner or later be intelligently answered, not by chemical theorizing, but by practical experiment conducted in particular and special localities, for an enlightened guidance of the dwellers on the soil. The importance of it will be understood when we consider that after near local surface surroundings have received due attention, distant sources of danger may exist to awaken apprehension. We are able to answer this question only in part, and in doing it must have recourse briefly to some experiments made in a distant State, suggestive of what made be done at home.

"At Ann Arbor, Michigan, in 1878, the discovery was made of offensive water in a cistern which was twenty feet deep and found to leak six feet under the surface of the ground, affording through the opening as good opportunity for the ingress of sewage as for the egress of all water above that point. An investigation into soil power for filtration, oxidation and thus purification, was made for the testing of different soils, and an answer to the question, Do different soils differ in their capabilities of removing organic matter? This was done with special reference to the removal of organic matter held in solution, and not merely in suspension; the latter is all that can be pretended for any filtering apparatus usually employed for cleansing drinking-water. The conclusions reached were used with especial force against the location of cemeteries within even long distances of wells, and concludes with this language: "We honor the dead as highly as others do, but it is not right that the dead should be allowed to murder the living." If, in the sanitary examination of wells, occasion arises for the special examination of the water of a suspected well, recourse must be had to chemical agency. Many methods have been suggested in connection with the examination of different classes of water, and whether one method or another be employed in the analysis, a classification of substances occurring or likely to be present must be observed, and will always include matter in suspension or in solution, either organic or inorganic, solid or gaseous, animal and vegetable. The bibliography of

this department is so extended that an attempt to compile a small part of it for this report, is impracticable. Having traversed the ground to some extent pointed out by the naming of this subject, we need only to add to the matter of inspection that the deeper the well, all other things being favorable, the less the danger of contamination, especially when the boring is through a heavy strata of clay, or what is popularly known as hard-pan, which will for a long time resist the percolation of surface-water. Artesian wells, although too expensive for general adoption, when sunken to great depths, afford a more perfect security. If, however, strict attention be given to surface surroundings, and soil advantages and disadvantages, we will hear less frequently of the dangerous outbreaks of endemic disease. A review of the facts presented in the discussion of the first part of our report points unmistakably to the necessity for some restrictive supervision of the indiscriminate use of wells in cities where, no doubt, long before urgent sanitary necessities existed, such wells were built regardless of increasing filth deposits above and around them."

At the meeting held at New Brunswick, December, 1881, Dr. Hopper, as president, treated of the "Danger in Noises," and discussed the question how far excessive and unnecessary noises should be brought under the restrictions of law. Reference was also made to the sufferings of the traveling public as follows:

"Imperfect, and sometimes impossible ventilation of railroad cars, became a source of such persistent and loud complaining that improved construction has now presented within our reach, as we delusively think, a correction of former wrongs; but while improved facilities are afforded for the correction of an over-heated and vitiated car, the stubborn or careless persistency of railroad employes in opposing a proper use of the means provided, is a subject of almost universal complaint. The conductor will very blandly promise suffering passengers to find a man who will regulate the ventilators; the brakeman, in turn, growlingly declares that he cannot warm the cars with the ventilators open; the resulting issue is, continued suffering, until some passenger, bold enough to move, applies the remedy. Contagious and infectious diseases frequently find a favorable means for propagation in the unventilated and miserably cleaned railroad car, and until some terrible calamity stares several communities in the face and calls out the activities of National and State Boards of Health, very little of well-directed effort is made in the direction of a proper cleansing of cushioned seats and bespattered floors. Perhaps we may find some grains of comfort in the lengthy correspondence between the National Board, a few State Boards of Health, and the Pullman Car Company of Louisville, under the threatened spread of yellow fever in 1879. All of this is as it should be, but the forced cleanliness of a dire emergency should be made the rule, and not the exception, to daily management

in the interest of public health. Another and quite as important matter, in connection with railroad sanitation, is the architectural construction and daily management of passenger depots.

"It has grown to be a crying evil against which public protest should be made, that, in a great many instances, to avoid the contraction of filthy diseases, passengers are compelled to wait for coming trains outside of depot buildings. Badly ventilated waiting-rooms and disgracefully located and managed water-closets, are constant sources of danger to the traveling public; but, as was intimated in the early part of this paper, the easy, idle manner in which our people take these perils by constant familiarity with them, points at once the lesson and the duty of those vested with authority for their abatement. Public opinion must be educated into a calm, grave consideration of the dangers as well as the offensiveness of those places built ostensibly for convenience and comfort.

"Local Boards of Health possess the power, under our sanitary laws to-day, to direct and control the construction and management of railroad depots, with their adjuncts, in the interest of public health, with quite as much success as they can exercise supervision over the plumbing and surroundings of private dwellings, school buildings, court houses, jails and almshouses."

The subject of small-pox and vaccination came up for extended discussion. The facts furnished were somewhat conflicting as to the relative indications for the use of the lymph, derived from spontaneous cow-pock, as introduced by Jenner, or the more recent advocacy for the use of lymph at first similarly derived, but transmitted from calf to calf instead of from arm to arm.

Dr. H. R. Baldwin read a paper which gave a history of vaccine inoculation, embracing important quotations and opinions on the subject of vaccination from the earliest times, and from standard authority. This paper was important and deeply interesting to the medical members of the Association. He condemned the wholesale vending of vaccine virus by apothecaries as tending to mischievous results.

Dr. Dennis, of Newark, followed with some practical remarks on the question of vaccination. He took the view that there was necessity of great care to secure the purest vaccine virus. He gave statistics to show that among the unvaccinated the mortality reached 35 per cent. Among those imperfectly vaccinated the mortality was 21¾ per cent. Where one mark was shown, 7½; two marks, 4½; three marks, 1¾; four marks or scars, which is proper vaccination, the mortality was only three-quarters of one per cent. Further statistics of interest to the medical fraternity were given. The conclusion

reached from these tables was that at least thirty unvaccinated persons died of small-pox where one died not properly vaccinated. He favored the use of bovine virus, and, to secure the greatest protective power from vaccination, he would favor the making of four marks or scars on the subject.

Dr. Baldwin spoke of the German plan of continued applications of virus at intervals of three days, until the virus ceased to take effect, and until the system was saturated with it.

Dr. Williamson said his plan was to make a large mark and spread the virus upon it thoroughly. Sores have been as much as parents or children could stand from one application of virus, and if there were four spots an inch apart they would run together. The better plan, he thought, was a repetition of vaccination two or three years after, if parents would be willing.

Dr. Hunt read extracts on this subject. He suggested that physicians labored under one great disadvantage, in that they did not know what kind of lymph they were using. He thought physicians should be exceedingly inquisitive on this subject.

The subjects of "Tube Wells and Water Filters" were presented by Prof. Cook, of New Brunswick, and J. C. Bayles, of Orange.

Prof. Cook discussed the whole subject of driven and bored wells, showing when and how each were applicable—their value in some cases and their failure in others. He showed that the water of deep wells was not generally to be considered as the rain-water of that season filtered through the soil, but rather as resident water which had been stored there for long periods; such wells, therefore, are not so easily affected by drouth. He expressed the opinion that a water-supply along our sea-shore would yet be found by driving wells deep into the lower marl strata, and gave some statements as to wells that have been put down in various localities.

Mr. Bayles showed how imperfect are most of the water filters in use, and that many of them merely detained coarse particles and in no other sense purified the water. Filters made by a brick partition thus strain the water and retain organic matter until the bricks themselves become foul and can only be cleansed by their removal. He expressed the opinion that spongy iron is the best filter material, but a good preparation of it is not now to be had in this country. Next in value is the magnetic iron ore, which is easily had in a coarse state. He objected forcibly to the use of zinc water coolers, inasmuch as the zinc

contains much arsenic, and is otherwise objectionable. The Kedzie water filter is the best one now in use, if only the zinc receptacle is replaced by galvanized iron or some other material.

The eighth annual meeting was held December 14th and 15th, 1882, in the Senate Chamber, at Trenton, and was one of the most useful meetings of the Association.

The address by the President, Prof. J. Madison Watson, of Elizabeth, dealt chiefly with the subject of "Social Sanitation." Only a few of the more important suggestions can be quoted:

"Sociology recognizes humanity as a triple unit, naturally divided into the family, the State and the church. These social divisions are not man's invention, but the outgrowth of his nature. Beginning from the sexual relations, all the family conditions are fulfilled in a society of two parents and their children, united by free choice, by consanguinity, natural affection and mutual interest. How instinct, reason, love, and all the natural forces of man, are thus securely bound to work together for the common weal.

"Since the State is the outgrowth of the family, and exercises its original defensive powers, the family is thereby entitled to protection in all rights essential to its integrity and prosperity. Some of these rights, such as marriage and parenthood, are not created by legislation. They exist prior to and independent of human enactment. The State is bound to give form, recognition and protection to these rights. Questions so grave, urgent, far-reaching and profound, involving ethics, anthropology and psychology, the entire history and science of man, should receive the most studied consideration of political philosophers and experienced jurists.

"Assuming to maintain all these rights of the family, the State must be held to a strict account for the discharge of its obligations. Necessary precautions must be taken, in establishing the society of the family, to secure deliberation, freedom of choice, and mutual protection and regard. Wise Christian laws must be devised, recognizing marriage as a *union* and not a voidable contract; for 'The man shall cleave to his wife and the twain become one flesh. What, therefore, God has joined together let not man put asunder.'

"And still, while happily constituted families, consciously or unconsciously, do much to prepare citizens to regard the State as the fatherland, the State, in wisely promoting the universal good by the establishment of free schools, in ministering to the alley and byway as well as the avenue and boulevard, has her chief promise of increasing prosperity and perpetual security.

"The period prescribed by the State for the attendance at school, between the ages of five and eighteen, is wisely chosen. It is the period freighted with peril, brightest in promise, decisive in result. Not too early to rescue thousands of young children from close rooms,

filthy streets, or cruel neglect, and place them in charge of the trained nurses of the State; not too early to begin systematic instruction with youth from homes of plenty; nor is it too prolonged to give the decisive bent which leads to usefulness and fortune. The curriculum adopted should be of such a character and scope as to fully satisfy the needs of this entire period, and awaken the desire for continued improvement.

"The worst impending evil arises from unduly taxing the growing frame with competitive mental effort, while its nervous force is needed to supply its natural wants, thus creating a distaste for all labor and blighting every flower of hope. Another inflicted evil, unwise and cruel, and injurious beyond expression, destructive of self-respect and brutalizing, is the commission of corporal punishment on young children. Happily, this relic of barbarism is no longer permitted in the schools of New Jersey. Many of the schools, however, suffer from insubordination; and many excellent instructors, not apt to govern, earnestly seek a substitute.

"Now I am prepared to say, with perfect assurance, that a suitable system of gymnastics, properly used in the schools, will almost wholly remove these two great evils. Its disciplinary effects on the pupil correspond to those of the soldier on the recruit. Nothing else is so effective in fixing habits of attention and obedience. The results of its use, even in institutions for the feeble-minded, are well nigh miraculous. Should not a practical knowledge of physical training be made an essential requisite for the graduates of the State Normal School and the public teachers? Do not the sanitary, material and military interests of New Jersey, imperatively demand the introduction of gymnastics in all schools and corrective institutions that are sustained, wholly or in part, by the State."

The articles of J. A. Adams, C. E., on "Disposal of Sewage in Cities," and of Professor Charles McMillan, on "Disposal of Sewage in Inland Towns and Places," both of which have since been published, elicited an important discussion as to the relative claims of large or general sewers and the smaller sewers which exclude storm-water. The opinion of most seem to conform to that of Mr. Adams, that the question was one of local adaptability, to be determined by soil, by natural drainage, by surface declivity and by the relations to adjacent water-courses. The discussion on the paper of Professor McMillan turned chiefly on the question of how far a stream could be relied upon as a neutralizer, dilutant or purifier of sewage. While the paper sought to give an approximate formula of calculation, Professor Leeds gave his experience with the Passaic river, and especially with the Brandywine, at Wilmington. At Coatesville, higher up, the water was found much polluted on account of certain factories there, but the

water just above Wilmington, before any refuse from the city was added, was found suitable for drinking purposes. Then, again, the water below Wilmington was polluted. Thus we are able to practically trace the process of purification taking place. We are not only to consider the change made by oxidizing processes, but by precipitation, by sunlight over the whole stream, by animal and plant life of all varieties from the great to the minute, and thus to remember that many agencies more than we have yet estimated, are at work in the conservative transformation and resultant purification.

J. C. Bayles, C.E., of Orange, read a letter which exhibited the method of dealing with the sewage of Birmingham, at Saltley.

"The sewage is carried through drains from the city to a farm where the land is irrigated with it, and crops of potatoes, turnips, etc., are raised. The soil is too rank for cereals. The wonderful feature of the farm is the absence of all offensive odor. Lime is used as the deodorizer, and it renders the sewage perfectly inodorous. Large tanks at the farm receive the sewage, and the overflow of the tanks is conducted through the farm by means of drains. There are 275 acres in the farm. It does not pay the expenses of keeping it, of course, as nearly 100 hands are employed, but it is cheap when the advantages to the city are considered."

Mr. Adams stated some facts as to it, and said the sludge was so unsalable that very much of it had to be buried at heavy expense.

Professor A. R. Leeds made a report as to the adulteration of foods. He showed a series of experiments as to infant foods. The facts as to these have since appeared in the State report.

The relative value of different forms of vaccine lymph, and the needs of revaccination, were ably presented by Dr. E. L. B. Godfrey, of Camden, and Dr. D. Warman, of Trenton. Dr. Godfrey first considers the objections urged against the Jenner or humanized lymph.

The paper next considered animal lymph and the three discussed methods of its propagation, viz., variolation of kine, retro-vaccination, and inoculation from original spontaneous cow-pox. The history of each of these was given, and the reasons why at present variolation of kine and retro-vaccination are not feasible sources of supply. The methods of inoculation from original cow-pox are then described, as well as the embarrassments connected with the present trade methods of supply. The conclusions arrived at by the author are thus stated:

"From a knowledge of the cultivation of bovine lymph, and from an experience in its employment for vaccination, two points, in conclusion, suggest themselves:

"Firstly. That lymph should be procured directly from propagators of acknowledged skill, intelligence and honesty; not through agents paid from thirty to sixty per cent. for its disposal.

"Secondly. That this Association should recommend legislation that would enable the State Board of Health to cultivate bovine lymph for gratuitous distribution.

"In our generation, when vaccination has curtailed small-pox to an almost incomputable degree, but a faint conception can be formed of its ravages in former times. From the middle of the sixth until the announcement of principle of vaccination, near the close of the eighteenth century, the most destructive epidemics of small-pox prevailed in every quarter of the civilized globe. Procopius, who flourished in the sixth century, gives the first description of the character of the disease, then raging in epidemic violence in Egypt and Arabia. Bruce, in his 'Travels to Discover the Source of the Nile,' expresses his belief that the abandonment of the siege before Mecca by the Abyssinian army was due to the effects of small-pox among the troops. During the ninth century the disease invaded England, and was carried throughout Europe by the Crusaders. In 1516 it was carried to St. Domingo by the Spaniards, and three years later it entered Mexico, destroying more than three millions of its inhabitants. In 1707 it reached Iceland; extended to Greenland in 1733, and in a short time destroyed one-quarter of the population of those islands. So terrible have been its ravages that, not excepting the black death, which destroyed in the Eastern countries during the fourteenth century more than twenty-four millions of people, or the sweating sickness of the sixteenth century, has this scourge been regarded as the most destructive of all the acute diseases known to man. Not alone for its great fatality, the loathsome condition attending it, or the disfiguration of those who escape it dangers, but for the demoralization it engenders, as seen in the prostration of business, the desertion of friends, and the abandonment of homes, has it been regarded by Macaulay as 'the most terrible of all the ministers of death.' When it is remembered that, in the century preceding the discovery of vaccination, forty-five millions of people died from the effects of small-pox; that more than two hundred thousand, according to Dr. Lettison, fell annual victims to it on the Continent of Europe; that two millions perished in the Russian Empire in a single year; that the yearly mortality in England was forty-five thousand, forty times greater than it is at this time, in proportion to the increase of population; that an epidemic existed in London for more than ninety continuous years; that cities have been desolated, villages abandoned, and armies disbanded, some estimate can be formed of the transcendent importance of the discovery of the principle of vaccination."

The paper of Dr. Warman confines itself chiefly to an exhaustive discussion of the ground on which animal lymph (not humanized) is to be preferred. He thus states some of the advantages of bovine lymph:

"Relying upon the statistical information which has been presented, showing the infrequency and small mortality of variola, in the early history of vaccination, that is, in the days when humanized lymph had undergone but few transmissions from the natural disease in the cow, the conclusion would seem to be fully warranted that frequently renewed bovine virus would afford an equal protection in our day. M. Warlomont (*Br. Med. Jour.* 1881) strongly reiterates the assertion made by him as to this matter some years ago. He states that out of more than 10,000 children vaccinated at Brussels with animal vaccine from 1869–70, not one case has to his knowledge been reported as having been attacked by the terrible epidemic that ravaged Europe soon after. He has made a number of appeals for information as to cases of variola, after animal vaccination, but so far without result. Others have made similar requests, and have offered large rewards for such information, but without avail.

"It has been repeatedly urged by some that bovine virus 'does not take well.' Without any reference to individual success, which of course depends altogether upon personal skill and experience, we have recently been put in possession of certain statistics which show that in experienced hands animal vaccination gives, to say the least, as good a percentage of successes as can be exhibited by vaccination done with ordinary current lymph by equally skilled vaccinators. Dr. Warlomont writes that when calf lymph is inoculated direct, taken from pustules at the proper age, no other failures are known but those resulting from the manipulations of the operator. Out of 300 children thus vaccinated by himself, not one puncture failed to produce a good pustule. When preserved vaccine was used in primary vaccination, the successes were at the rate of ninety-six per cent., and in revaccinations at the rate of sixty-two per cent.

"Ernest Hart (*Med. Times and Gazette*), in a recent address on animal vaccination, presents some further statistics which were supplied him by Dr. Carstan, of The Hague, as follows: In 1869, when animal vaccination was begun in Rotterdam, there were sixty-seven failures out of 542 operations; last year, 1880, there were only four failures in 2,727 operations, whilst in 1,563 of these the full amount of ten vesicles was obtained.

"At Amsterdam, there were nineteen failures in 1879, when animal vaccination was started, out of 626 operations; whilst during the last six years there has been but one single failure, out of a total of 14,849 operations. Similar experience comes from The Hague, Utrecht and Haarlem; and the gross total of all the vaccinations performed in Holland with animal lymph, including all the early efforts, shows

that out of 60,754 operations, only 720, or little more than one per cent., have been unsuccessful. Testimony such as this, says Mr. Hart, and on so large a scale, shows indisputably that the allegations made against the taking power of calf lymph have no foundation in fact.

"The conclusion of the whole matter, therefore, from all the testimony that we have been able to gather, establishes the following facts:

"1. That both humanized and bovine virus are good, but that, in point of protective power, bovine lymph is superior to humanized virus.

"2. That humanized lymph, but few removes from its bovine origin, as in the days of Jenner, is but slightly, if at all, inferior in protective power to the bovine; but that continually transmitting it through the human system is a cause of gradual and certain deterioration.

"The bovine lymph is preferred again for the simple reason that with humanized virus certain dreaded diseases may be communicated with vaccination, although the danger is no doubt greatly exaggerated. However, the public is entitled to the benefit of the doubt. Besides, the production of bovine lymph can be carried on in a much more regular way, affording a constant unlimited supply, as needed. And finally, we desire to emphasize and impress upon your minds that all these superior merits which we claim for bovine virus, apply only to a pure and genuine virus. It is a well-known fact that the business of producing the bovine lymph in this country has been undertaken and carried on by persons of neither skill nor knowledge of the subject, and much spurious virus has been sent broadcast over the land. The cultivation of bovine lymph may be considered a skilled pursuit, and a liberal amount of training, experience and knowledge should be required of those who engage in it. The propagation of animal virus, of perfect quality, is of such momentous importance to the public, that it should not be left solely to private enterprise or business cupidity, nor degraded to the level of a commercial trade, but should be under the control of the national or State government, so that lymph of undoubted good quality could be always obtained."

A paper was presented by the Rev. F. R. Brace, Superintendent of Schools for Camden county, as chairman of the committee, as to "What is Feasible as to Method and Law for the Protection of Schools from Uncleanliness and Contagious Diseases?" The paper has important suggestions, and so is published with this report.

Professor H. B. Pierce, city Superintendent of Schools for New Brunswick, as a member of the committee, made an unwritten address on the same subject.

He opposed general recesses at school, on the ground of dangers to the children, moral and physical, but said that the pupils should be allowed individual recesses. In place of general recess, he suggested

calisthenic exercises, during which the air of the school room may be entirely changed. He advocated yearly sessions of nine months, and the teaching of physiology and hygiene in their elementary forms.

In conclusion, he offered the following:

Resolved, That the State Board of Health be requested to have printed slips, containing the names of dangerous diseases, which are considered contagious, distributed among the city and county Superintendents of Schools.

That physicians be requested to notify either the Superintendent or Principal, whenever a contagious disease is found in a family, of whose members one or more attend school.

That when such notice is received, the teacher be authorized to suspend all pupils from such family until the attending physician certifies that all danger from contagion has passed.

That the State Board of Health be requested to obtain the passage of a law forbidding the holding of public funerals in all cases where death was caused by a contagious disease; also, when public notice of funerals is given, such notice shall name the disease of the deceased.

In order to improve the health of school children, the following was submitted:

Resolved, That the school year begin on the Monday next to the 15th of September, and close on the last Friday in June.

That the morning session commence at 9 o'clock, and close, for primary classes, at 11:15, and for all other classes at 11:30; that the afternoon session commence at 2 o'clock, and close, for primary classes, at 3:45, and for all others at 4.

That no general recess be given, but individual recesses be granted whenever needed.

That calisthenics be required twice in the morning session and once in the afternoon, allowing from three to five minutes for each exercise, and during such time the air of the room be wholly changed.

That the State Board of Education be requested to require of all teachers, as one of the necessary qualifications to obtain a certificate, a knowledge of the elementary principles of physiology and hygiene.

At the ninth annual meeting of the New Jersey Sanitary Association, held at the State House, Trenton, December 6th and 7th, the President, J. C. Bayles, of Orange, presented the annual address, on "Methods of Popularizing Sanitary Information." He showed that people had and felt much interest in the subject, yet, because they depended mostly on newspaper items, they were often misled. Half-knowledge can do a great deal of harm. He urged the importance of information for

the people from authorities, and of the distribution of sanitary leaflets, and instanced the effective service of some of the State Boards. The value of local Sanitary Associations was also urged and illustrated.

J. J. R. Croes, C.E., presented a paper on "The Methods of Sewage Disposal Without Discharge into Streams."

He alluded to the fact that sewage-water contained organic matter, both in suspension and solution. The solids, in ordinary town sewage, comprise from 70 to 200 parts in 100,000 by weight, averaging about one-eighth of one per cent. of the whole volume, which is equivalent to 128 parts in 100,000. Of these 128 parts, 82 parts are held in solution, and 46, or only one twenty-second of one per cent., are in suspension. This, although small, is very troublesome, since the parts are finely comminuted and settle slowly, and, when precipitated, form a slimy and offensive mass, ninety per cent. of the bulk of which is water, and which can neither be pumped nor shoveled by ordinary processes. This is known as sludge. The eighty-two parts of impurities in solution need also to be diminished. Ordinary sewage contains 10 times as much organic carbon, 600 times as much ammonia, and 10 times as much chlorine, as is considered admissible in drinking-water. The sludge, which is of little value as a manure, must be separated and disposed of, and the effluent water, which is highly polluted, must be purified. Simple subsidence of the solids is slow, and produces offensive odors. The addition of some chemicals hastens subsidence and retards decomposition. Sulphate of alumina and chloride of iron are the most effective.

For oxidation, which is the chief desideratum, no method has been found as efficient as passing the water intermittently through porous soil. To effect disposal of the particles, so that every one can be brought into contact with the air, the most effective method is to "saturate, with the fluid, the upper stratum of a bed of porous earth, and then dry it by absorbing part of the fluids by the thirsty roots of plants and letting the rest drain through the soil, into which, as the fluids disappear, fresh air enters from above and furnishes a fresh supply of oxygen to repeat the operation when the time has arrived for another supply of filth-laden fluid to be poured into the soil." As the matter in suspension can first be removed in the shape of sludge, and as this tends to clog the trenches and to impede the circulation of air, the author contends that, in many cases, the sewage should first be clarified by the precipitation or removal of the grosser or suspended material, and then the principle of intermittent filtration be applied.

He believes that all that is needed is for chemists and mechanical inventors to grapple with the problem of clarification. In the plan of precipitation and running off into vats for evaporation, there is too much offensive odor. In others it is drawn off into canvas bags, which are subjected to hydraulic pressure and the moisture thus squeezed out. A process which promises good results, is that of filtration of the sewage, after the addition of the precipitant, by a mechanical filter, in which sawdust is used as the filtering material, and the surface of the material removed by a revolving cutter as it becomes clogged. The combined sawdust and sludge is readily compressed into cakes. This may be burned under the boilers which furnish steam-power to operate the works. The idea of profit must be secondary to that of health. In a number of English towns, the expense of preparation of the ground for intermittent filtration, including the settling tanks and all the pipes, averages $400 to $500 per acre. Preparing the land for *sub-surface irrigation* would probably cost $2,000 per acre. The annual cost of maintenance of sewage-disposal works, in several English towns, averages twenty-five cents per head of the population. Where sewage is to be purified, it is desirable that its volume should be as small as possible, and it is not advisable that any more rain-water, or drainage-water from the soil, should be delivered at the disposal works than is absolutely necessary.

C. F. Wingate, C.E., Prof. C. F. McMillan, E. M. Hunt, M.D., and others took part in the discussion.

Mr. Wingate urged the importance of a due consideration of all such methods of sewage disposal as will be necessary to such towns as cannot or ought not to dispose of their sewage into streams.

Prof. McMillan thought that Mr. Croes had overlooked that much land would not permit drainage six feet in depth with proper outfall, and so could not be prepared for soil absorption or distribution so as to permit the sewage of 1,000 persons to have intermittent filtration on one acre. He alluded to the successful dealing with an uninviting piece of ground at Princeton by means of the small pipe system. The value of all small pipe and of deep drainage was urged on the ground that these serve as air-tubes through the ground, directly, as well as by being water carriers, and relieving the soil from its water and so admitting more air.

Dr. Hunt suggested that the arguments for sewage disposal, other than into streams, must be based on considerations of locality, economy, etc., in all cases, since it could not be admitted that many

rivers may not in distances of a few miles dispose of fresh sewage. He drew attention to the fact that uncropped soil, in itself, had no great oxidizing value, but that those who advocated ground disposal concentrated their chief plans on securing the presence of air in the soil. If so, and if this is, after all, the great agent, air can reach sewage in the great open and in uncovered streams and rivers and amid the flow of currents, and over rocks and stones amid light and wind and wave as well as in most ground.

T. W. Harvey, M.D., of Orange, presented an elaborate paper, in which the following contention was supported:

I. That malaria chiefly occurs as a result of heat, moisture and vegetable decay.

II. That it is probable that there is a germ entity, the development or sedation of which, amid fertilizing and proliferating conditions, gives rise to malaria.

III. That, oftener than we have thought, malarial diseases result from drinking water charged with vegetative life, or the specific products of decomposition.

Dr. Harvey supported this view by some opinions of others and by interesting cases of his own, in which the use of particular wells or waters had caused malaria in neighborhoods or under circumstances where those not using them escaped.

Dr. Hunt, by direction, opened the discussion. After alluding to the recent tendencies to limit or deny the paludal origin of malaria, he showed how, while admitting a biological factor, it was still in full evidence that abnormal conditions of vegetable decay and neglect of proper drainage were the occasions of the disease. It was also pointed out that not only were marshes, etc., the habitats, but that these differed, and that individuals also differ as hosts for malaria. Some of these differences were noted. Those localities and those individuals which are best made to conform to known laws of prevention are the most successful in preventing malaria.

Dr. Benjamin, of Camden, gave great prominence to the germ view of malaria, and showed how it, and it alone, would account for the natural history of the disease.

H. P. Godfrey, M.D., of Camden, read a valuable paper on the explanatión which the germ theory affords as to the origin, cause, conduct and prevalence of the specific diseases. He illustrated how, in one disease after another, the phenomena of occurrences were thus explicable.

J. W. Pinkham, M.D., of Montclair, read a paper on "Domestic Wells and Cisterns, and the Best Method of Construction." After an analysis of the sources of water, and objections to water as obtained from shallow wells, the author claimed that the open well must go, and that there is more safety either in driven wells or in such as are arched and concreted to at least six feet below the surface. Dr. Pinkham alluded to the error of view induced in digging wells by the apparent running in of rivulets from one or more special directions. While it is true that the stratification or looseness of soil may determine some of these, it is also true, practically, that a well is the drainage-tube of a general area of ground surrounding it, and, as such, must represent to no small extent the organic and some of the inorganic material contained in the vicinity. The use of cistern-water was also advocated, it being shown how cisterns could be protected from leaves and settling on roofs by screens, and how a brick septum would serve as a filterer.

George P. Olcott, of Orange, indorsed the views as to the feasibility of cisterns, and showed how the outside finish of ground cisterns and proper puddling or cementing are important. For the sake of cheapness, many cisterns are very carelessly built. Warning was given, both in the paper and discussion, against the building of cesspools where they might get access to wells.

Prof. A. R. Leeds treated of "The Agencies, both Natural and Artificial, Affecting the Purity of the Passaic River Above and Below Paterson." After giving various facts as to the water of this river, and after statements as to various other rivers and localities in comparison, he spoke as follows:

"It should be distinctly stated that there is no foundation in fact for the oft-repeated statement that water once polluted by sewerage can never again become safe for drinking purposes. If this statement were true, it would exclude the water of London, and of very many towns in Europe, and with the exception of Brooklyn, Rochester, and a few other cities, most of the large towns of the United States, from the number of cities having safe water-supplies. There is a *vis medicatrix* in the general operations of nature as well as in the human system, and no one whose attention has not been particularly turned to this subject, would adequately realize the resistless energy with which nature, when we do not interfere with her operations, as we do in noxious grave-yards, oxidizes and soon gets rid of every particle of effete organic mattter. But when this effete organic matter is placed under conditions most favorable to chemical change, as it is when dis-

solved in an extremely dilute condition through a vast volume of water; when it is directly acted upon by the oxygen in contact with the surface of flowing water, or artificially mingled with the air in tumbling over rocks and falls; when the oxidizing action thus produced is aided by the oxygen dissolved in the water and that which is liberated by the pores of aquatic plants, then this destruction is much accelerated. But this is not all. Light itself is a most powerful aid in increasing the rapidity of oxidation and in effecting these decompositions. Until the discovery of chlorine and bleaching powder, light was the only agency used to bring about an oxidation of the coloring matters in cotton and woolen goods, and thereby bleaching them. The same oxidizing action is taking place, aided by the chemical energy of sunlight, in the case of the matters dissolved in water, with the difference that the nitrogenous organic matter, which is the most objectionable part of this organic matter, is far more prone to decomposition and far easier of oxidation than the comparatively stable bodies which form the natural or artificial coloring matters of cotton and woolen goods.

"In the third place, aquatic plants and living organisms of unnumbered variety play a great part in altering, decomposing and assimilating organic and even mineral constituents in the water. Finally, clay and earth have an energetic attraction for ammoniacal compounds and nitrogenized organic substances. Every rain which washes into a stream finely divided earth, has a powerful influence in purifying and sweetening the water, because this mud in its precipitation carries down with it a large amount of organic material which it has removed from solution. The action is analogous to that of charcoal, which absorbs the noxious gases of water, and is able to remove from solution the strongest tinctorial substances, such as indigo. Indeed, the use of clay to remove sewage from water has been recognized in many patent processes of sewage precipitation. But what man does on a small scale and in a very crude manner, is done on a great scale and most perfectly by nature. The fact that lands periodically overflowed by river-water are so fertile, like the banks of the Nile, which have never lost their fertility, though longer cultivated perhaps than any part of the earth's surface, is due to the organic matter carried down by the finely divided mud, and not merely to ordinary organic matter, it should be remembered, but to ammoniacal and nitrogenized organic matter, such matter as is very easy to decay on the one hand, and very easily assimilated as nourishment by growing plants on the other.

"I hold, therefore, that the statement so frequently made, that water once polluted by sewage cannot again become safe for drinking purposes after flowing any number of miles, is contrary to our common experience and observation. Furthermore, that the statement ignores the operation of natural agencies, the reality and efficacy of which are readily apparent. Finally, that wherever the pollution and subsequent self-purification of a flowing stream has been patiently

investigated, the chemical testimony as to the reality of this self-purification has been convincingly demonstrated.

"It is due to this process of self-purification, as I believe, that of the sewage of Paterson and Passaic a certain residue only remains at Avondale bridge. But each year this process is less adequate to deal with the increment of pollution, and each year the perils attendant upon the influx of sewage from above increased. The following is a recent analysis:

"PARTS PER 100,000.

	Newark Intake.	Jersey City Intake.
Free Ammonia	0.0065	0.045
Albuminoid Ammonia	0.027	0 03
Nitrous Acid	0.008	0.008
Nitric Acid	0.37	0.39
Chlorine	2.85	9.70
Oxygen required to oxidize organic matters	0.46	0 49
(Same) as determined by reduction of silver	0.25	0 27
Total Solids	12.50	27.50
Dissolved oxygen per liter	3.65	4.01

"The meaning of these figures is that the Newark sewage must be kept out of the Passaic, or the Passaic must be abandoned by both Newark and Jersey City as a source of water-supply. The grand jury of Hudson county has accordingly presented the mayor and corporation of Newark, for maintaining in the present sewage system of Newark a nuisance, and it is upon the issue of this procedure that the future history of the water-supply depends."

In the discussion, allusion was made to the fact that *in very large or deep reservoirs* the lower water sometimes seems to become dead. It was suggested that there was interference with the vitality of the lower forms of bacterial life which were believed to conserve the purity of water. Not infrequently reservoir-water is not up to the quality of that in the river or source from which it comes. If so, even the water in stand-pipes need occasional comparison with that of the source. Pipes also vary in their supply. Professor Cook stated that just now two pipes in New Brunswick showed difference in supply which as yet was not accounted for. Changes that may occur in the inner surface of pipes must be studied. Sometimes these changes are such as impart taste or smell without any serious results. But we must seek to know the cause in order to determine whether it is casual and harmless or dangerous.

The subject of school hygiene was presented in papers by Professor H. B. Pierce, of New Brunswick; James Green, of Long Branch, and J. Madison Watson, of Elizabeth. Professor Pierce had been appointed the chairman of a committee with reference to resolutions

relating to school hygiene, which had been presented the former year. Already these resolutions had resulted in some valuable leaflets from the State Board of Health. Professor Pierce still urged the importance of compulsory ordinances as to contagious diseases, and for the prohibition of public funerals where there had been deaths from contagious disease; also that in all communicable diseases the notice should name the disease, so that those not wishing to attend, and especially children, might avoid exposure. While the value of these suggestions was recognized, Dr. Hunt, Dr. Newton and others expressed doubt as to the feasibility of including all these in compulsory legislation. Already the law gives authority to local Boards of Health, where they deem it necessary to the public health, to interdict public funerals and to require the notification of contagious disease. To compel local Boards to do this should not be the work of State legislation, unless in emergencies where the evil was spreading beyond localities and jeopardizing the State.

Professor Pierce again urged examination of teachers in the elementary principles of physiology and hygiene. The evils arising from long recesses and the advantages from calisthenics in the school room, and reliance upon very short recesses or individual permission, was again urged. The Association showed much interest in the views expressed and appointed a large Committee of Conference, with power to act by way of recommendation to the Legislature or to School Boards.

The substance of Principal Green's paper will appear in this report. That of Professor J. Madison Watson will be in the ninth volume of the American Public Health Association.

Professor C. F. Brackett, of Princeton, explained such appliances for the raising and distribution of water as are of more recent application. In Manchester, N. H., the source of supply has been made to furnish the power by water-wheels and pumps much above the source. By another contrivance, a bucket, automatically filled, is made to work a pump-plunger in connection with a counter-weight so as to supply water from a small stream to a number of houses. Solar heat has been applied so as to work an engine and pump, and raise water from driven wells. By the use of electricity as a transmitter of power over long distances, the sewage of a city situated in a valley entirely surrounded by hills, may be made to run dynamos, drive water-wheels and so transfer power to a pumping station as to raise sewage or water over ascents where drainage and tunneling would be impracticable.

In that distribution, which needs to take place after water has become the vehicle of organic matter in suspension or solution, as in the ordinary sewer-pipe, he illustrated the advantage of a running stream constantly fed with air at every possible point. Air tends to adhere to surfaces and to water and to mingle with it. If, from the upper segment of the pipe, there go up wherever possible small tubes for admission of air, and if these tubes reach down so as to go into the flowing stream, there will be a constant adherence or drawing in of air which thus mingles with the water and performs its oxidizing and purifying processes with remarkable rapidity.

The subject of filtration was treated by Professor Geo. H. Cook, of New Brunswick. Its contents will be found in this or a subsequent report. These selections from the meetings of this Association thus present an index of the broad field of sanitary science and art, and contain very valuable suggestions for the people of the State. Physicians, engineers, chemists, teachers and the workers in the practical details of mechanics find these conferences of great value and are thus contributing to the social, household and economic welfare of the State.

TRADES AND OCCUPATIONS.

BY EZRA M. HUNT, M.D., SECRETARY.

The relation which an inquiry into trades and occupations has to public health and welfare has been recognized from the first conception and application of sanitary art.

It first became apparent in an inquiry as to poor laws and the effect of friendly societies, because it has so often found that penury or sickness had resulted from the effects of trades or from the conditions under which they were followed.

The first official appointment in England that can be said distinctly to have had its origin from the writings and appeals of sanitarians, was that made in 1832, when Dr. T. Southwood Smith, Mr. Thomas Tooke and Edwin Chadwick were appointed to investigate the question of factory labor.

The prosperity of a country and the welfare of the population are very dependent upon the various trades and occupations and consequently upon the health of the operatives.

There are various reasons why so important a public concern cannot be left to self-regulation. The multitudes of workmen, as well as their employers, are ignorant of some of the necessities of physical life and of the special complications and embarrassments of various occupations. The harm done is often gradual and is not realized until well nigh irremediable.

Most, even, if feeling the embarrassments to which they are exposed, do not know how to ameliorate or avoid them, or, if they do, cannot enforce the provision of and compliance with the needed adjustments.

First of all there is need that there be a better understanding on the part of all of the demands of life and health and the conditions and surroundings which are most favorable thereto.

Next to this is a knowledge of the real evils and how to counteract or correct them.

Each trade and occupation needs to be considered as to its special demands, exposures and liabilities. Circular XL. of this Board, as contained in this report, outlines these. The effect of each department of any given trade needs to be considered. Then comes the general question as to by what methods or devices the evils are to be overcome or reduced to a minimum. There is but little realization in very many trades how much human life is shortened or its powers abridged by the occupation or by the place and circumstances under which it is followed. There are many industries in which the power to make full time and do good work does not extend over twenty years of the artisan's life.

From the elaborate and proximately correct tables of Hirt we have, as averaging, for those under treatment, *of under fifty years of age at death*, for agate-polishers, britannia-workers, cabinet-makers, cement-makers, chimney-sweeps, coppersmiths, cotton operatives, diamond cutters, glass-cutters, goldsmiths, locksmiths, laborers on artificial flowers, arsenical mines, color-works, lead mines, lead smelting, quick-silver, silver smelting, sugar of lead, machinists and stokers on rail-roads, millers, millstone-makers, mirror-makers, needle-polishers, painters, plasterers, porcelain-makers, sandstone workers, stone-cutters, tinkers, varnishers, while various other occupations follow in close degree of briefness of life. It is noticeable especially how large a portion of these are trades in which there is inhalation of irritating dust. It is also to be borne in mind that often these deaths at middle life stand for long years of sickness or of enfeebled and diminished work. Our climate, our methods of work and the use of machinery, make some modification as to trades, in some cases increasing and in others diminishing the evils.

We need to take the facts in evidence as furnished by careful statistics and deductions from foreign sources, and then, by our own close examinations, see how far these are to be accepted. This Board has, from time to time, directed its attention to various industries, in order to acquaint itself with the character of each and the peculiar liabilities which they involve. We now have under systematic observation the effects of pottery, printing, glass making, oil cloth, and flax and jute industry.

The object of this paper is to furnish some facts as to some of these, preliminary to those special observations which are now being made and which will be reported in due time. The interests of the working classes in all these regards must not be overlooked.

PRINTERS AND PRINTING.

Dr. R. S. Tracy, of New York, in his Treatise on Occupations, says: "Printers, including compositors and pressmen, are generally pale and unhealthy in appearance. The characteristic anæmia is largely due to the bad ventilation of the rooms in which they work, to the lack of exercise, and, in the case of pressmen, to the heat of the press-rooms. Compositors frequently suffer from dyspepsia and diarrhœa, and also from bronchial catarrh and phthisis. According to Tardieu, twenty-five in one hundred die of the latter disease. Pneumonia is common among them, and is likely to be severe. The habit of putting type in the mouth, leads to the formation of cracks and fissures of the lips, and small tumors on the inner surface, caused by the obliteration of the mouths of the follicles, which sometimes ulcerate and form painful sores. Lead-poisoning is very rare among them, but there are occasional cases of 'professional cramp.' Pressmen are said to suffer frequently from varices and heart disease."

Printers, from the sedentary character of their work, incline to keep the rooms hot, and being susceptible to draught, breathe much foul air if they are compelled to depend upon open windows for ventilation. Where this is the case, the windows should always be provided with a board piece to put under the lower sash, and so raise it as to let in air between the upper and lower sash, or should have an opening at the top and a hood or device for directing the cold air first upward to the ceiling and thus prevent draught.

Dr. Edward Smith has written a valuable report on the sanitary circumstances of printers in London. (6th Report Medical Officer Privy Council, 1863.)

He divides them into the following classes: Readers; compositors, who are remarkable for quickness and nervous excitability; pressmen, machinemen, and then warehousemen, who are essentially porters. Reading boys and boy machine-tenders are also spoken of.

In newspaper offices, the extra demands made by night work and by irregular hours, need to be given full consideration as increasing the tax and risk to vitality.

The *Reader* is necessarily more educated than the usual workmen and has often both literary and constrained labor to perform. In large establishments he must often be ready at hand with his correction, work rapidly, and at late hours. He is very apt to be put in some

corner closet or confined room, ill-ventilated, subject to draught from the opening and shutting of the door to his den. Many of them have a pale and overworked aspect, which comes from confinement and want of exercise out of door and all over the body. They often have headache, dizziness and eye affections, caused by their close reading and correcting of proof. They should have every advantage of light, warmth, pure air and a comfortable position, and should often change posture while at work. Many are forced into other occupations by the failure of their eye-sight. Careful periodical examination of the eyes by a skilled oculist, would save many of them form permanent disability or embarrassment. In a close observation had of one hundred for ten years, in London, in various leading offices, the average age at death was forty-five, and chest and nervous diseases predominated.

Compositors—These usually work standing, or varying occasionally to a high sitting posture for rest. The distribution of light for them, which should be mostly from above and on the left side, is often defective. We have generally found the rooms in which compositors work, illy-ventilated and dirty, because there is no thorough system of room-cleaning. It is of great service if, during meal hours, for a longer or shorter time, the windows are thrown open and the air changed. Tubes similar to the Tobin ventilator, communicating with the outer air and permitting of opening and closing, are often of service. During the time when the gaslights are used, there is less ventilation through the side and other apertures. In such rooms the air is often too moist, as shown by the rills on the inside of the window-panes, and thus the air is more oppressive. Often, by means of staircases, the upper rooms receive both hot and foul air from the lower ones, and so are more unhealthy. When the heating is by hot water or steam-tubes passing around the sides of the room, it is to be remembered that it is the air of the room, and not fresh air introduced from without, that is being heated, and that there is much more heat around the sides than in the center of the room. This is said often to give rise to rheumatism, and, to those who have one leg near the tubes, to the "printers' sore-leg disease."

Dr. Smith, after making many special facts as to health and disease, says: As to compositors, as a rule, I can arrive at no other general conclusion than that they are a "sensitive and not robust race, enjoying life in only a moderate degree, and not peculiarly liable to varied and acute diseases, but with a tendency to defective alimentation and

assimilation, and thence towards exhaustion of body and consumption." Short sight is common, and it is also commonly believed that "the conditions of the employment lead to habits of drinking." New type and case dust are also claimed as injurious—the former because the metal gets into the skin or mouth, and the latter as an irritant to the lungs. It is noticed that many printers keep at work with an amount of disease which would effectually disable a person exposed to the weather or engaged in more laborious occupation.

"Consumption is known universally to be the chief cause of death among printers." "It is about twice as prevalent among them as among the members of the whole community. What may be called stagnant heat, as well as foul air, greatly depresses the vital powers. The whole excess of death-rate over that of the general community is due to the unhealthy conditions in which they are placed, and to causes quite preventable." Both on account of the heat and of the consumption of oxygen caused by the gaslights, it would be a great improvement if electric light, properly shaded, could be introduced for all night work. Each room should have a thermometer.

Pressmen—The occupation of pressmen is more laborious and a more general exercise of the body. It develops most the right side of the body, and inclines to roundness of shoulder and constriction of the chest. The room is generally in one of the lower floors, and often lacks in light and ventilation. As the heat in the press-room is greatest at night, from the perspiration and the handling of the damp paper, there is liability to rheumatism or myalgia in some form.

Machine-Minders and Engineers work mostly in the basement or on the lowest floors, where bad air, dampness and the absence of light are unfavorable to health. We know of no special evils incident to their actual work. The boys who assist and remain long at the work are usually pale and lightly built, and do not grow rapidly. The place, the monotony of the work, long hours of labor and little change of posture are probably accountable for this. These and irregular or restricted sleep tell upon these more than adults. As a rule, a printer's office is a poor place for the growth and physical development of young persons.

The improper location of closets and urinals is found to be a great source of foul air in printing houses, as in many other close industries. Lime washing of all the rooms and painting of the rooms each year,

and a more special housekeeping care is greatly desirable, because the walls, as well as wood-work, become blackened and soiled, and light and color, as well as cleanliness, are important.

POTTERS AND POTTERY.

The diseases of operatives in clay and in pottery have been studied at various times and in different countries from the days of the learned Ramazzini, of Modena, to the present. But occupations and the modes of their pursuit have so changed that we have to confine our studies to those modern times which have to do with the introduction of machinery.

In the supplement of the Registrar-General of 1871, reviewing the statistics of ten previous years, Dr. Farr says: "The earthenware manufacture is one of the unhealthiest trades in the country. At the age of joining it is low; but the mortality after the age of thirty-five approaches double the average; it is excessively high; it exceeds the mortality of publicans (inn-keepers). What can be done to save the men dying so fast in the potteries and engaged in one of our most useful manufactures? Among the glass manufacturers the mortality is highest at twenty-five to thirty-five than among the earthenware manufacturers, but it is lower afterward."

Dr. Parkes, in his "Manual on the Personal Care of Health," laments that, "in the pottery factories where, as in metal trades, there is much dust, very simple plans, such as wearing, in certain operations, canvas masks or respirators, are never thought of," and that men "go carelessly on in the old way, letting ill-health come as if it were inevitable."

The most valuable report on the diseases of potters is that of Dr. Greenhow, made to the Medical Officer of the Privy Council (1860), Great Britain. Although the inquiry had special reference to lung disease, it fairly presents the various exposures which this industry involves. The observations were chiefly made in the well-known pottery district of Staffordshire, England.

A very careful census of population and comparison with other industries showed that "this class of operatives suffered a much larger mortality from pulmonary disease in proportion to its number than did others."

In pottery districts where the industry has long existed, the potters are short in stature and sickly in appearance. In Stoke and Wolstan-

ton, this could not be attributed to poor dwellings or length of hours of work. As the female population is largely employed, good authorities have attributed it to poor care of children at home, poor housekeeping and general want of race vitality. There are so many departments in pottery, and so many kinds of work, that they cannot all be considered together.

The *Slip-Makers* are those who attend to the grinding and mixing of the clay, so as to form a dough suitable for handling. This work is often done in damp cellars, and causes rheumatism; the workmen get wet with the clay.

The *Mould-Makers,* who make the moulds upon which the various articles are shaped, use much plaster of Paris. There is much fine dust and, sometimes, excessive heat in the process of drying. Many of the workmen suffer from throat and chest irritation, ending in cough and bronchial expectoration. Cleanliness on the part of the workmen by the use of overclothing, proper ventilation and a thorough cleansing of the shops, so that dust would not be raised in moving about, would aid very much. As this matter of dust is so common a cause of irritation, we may notice it here as connected with many occupations. All devices that diminish the amount of dust are valuable. For this purpose, wet grinding is often resorted to. This is of great service in such industries as admit of its application. Thorough cleansing of the rooms and removal of all fine dust between the hours of work is a great advantage. Next to this, is the arrangement of fans, or some method of removing the dust, both from the person and from the room. Various forms of masks, respirators, etc., have been employed. Some of these are useful, but as most of them impede respiration, they are not acceptable to workmen.

The keeping of the mouth closed and breathing only through the nose, and the occasional cleansing and wetting of the nostrils by a sponge, is of great service. Those who thus manage, and several times a day clean the mouth and throat by cold water, very much diminish the evils of dust inhalation. Thorough washing of hands and face, and change of garments, on which the dust falls, is of much service. The habit of eating in the work room is not a good one.

Flat Pressers are those who roll out the dough to proper thickness and fit it to the mould. The material is wet when used, but the scrapings soon become dry and cover the floor and work benches with

dust. As boys are constantly engaged in carrying the various pieces for drying or baking, there is generally a great deal of this fine dust in the air, even when it is not visible. Proper ventilation and cleanliness are necessary. If the drying places are near, both the moulders and the boys suffer from the temperature. As much of the work is piece-work, and many employ their own assistants, evil sometimes comes from irregular haste.

Dish-Makers are less exposed to heat and dust than saucer and plate-makers, because the process is slower. *China flat pressers* are less exposed to heat, but a little more to dust. *Saucer and plate-makers* create much dust in giving an edge to the saucers after they have been dried in the stove. Intermittent currents of hot air strike the worker, and this, with the dust, is one of the causes of potters' asthma.

Hollow-ware Pressers are exposed to much of the same influences as the flat pressers. Both these and the hollow-ware pressers have their full share of dust, and somewhat constrained positions. The sameness of posture and motion needed, both by its constriction and routine, is wearing upon many of the constant workers in pottery.

Throwers suffer chiefly from their constrained position, and, if young, from the weight of the mass.

Turners, who turn into a complete form the ware formed by the throwers, are considerably exposed to dust, but not much to heat.

The *Sagger-Makers*, who make the saggers, which are to hold the ware to be placed in ovens, both in their forming and in their placing-in and removal from hot ovens, have both dust and extremes of temperature.

The *Placers or Oven-men*, who pack the ware in the saggers and afterward place it in the ovens, use sand or flint-powder, and are much exposed. The ware is drawn when the heat is very great.

Scourers are those who remove dust, sand and blisters from the work after baking. They are much in dust. Where there is flint-dust it is all the more penetrating. Biscuit scouring being a most hurtful operation, needs special provision. All these are directly in dust below their nostrils.

Handlers, who make or put on the handles to jugs, cups, etc., are

liable to suffer from heat and dust. Those who carry the ware have frequent changes of temperature.

Decorators, or those who engrave, print or paint, are often in close rooms, in constrained positions, and sometimes overheated by reason of the nearness of ovens or fires in which the work is dried.

Dippers, who dip the work into a liquid glaze, containing lead, previous to its final baking, are said to occasionally show the blue line and other signs of poisoning.

China Scourers respire the most irritating flint-dust, and seldom can work more than five years. All become asthmatical sooner or later. Other pottery workers, as in other harmful occupations, appear to resist the deleterious influence of their calling for some years and then break-down at middle age. Some form of flint is used in most ware, and its sharpness and hardness make it especially irritating to the lungs.

The only alleged effluvium nuisance connected with pottery which is recognized as affecting health, is that resulting from the process of firing. Ballard, in Part III. of his valuable papers on "Effluvium Nuisances," eighth annual report of the Local Government Board, 1878–79, (medical supplement,) includes this among his investigations:

"After being dried, articles of earthenware are subjected to their first firing in what is termed a 'biscuit oven.' When the ware leaves this oven it is in a hard but porous condition, termed 'biscuit.' It is on this ware that any pattern it is to receive is laid on. The pattern is printed with oil upon thin paper, and, being laid smoothly upon the ware, it is absorbed by the porous surface. The paper is now rubbed off and the ware dipped in its appropriate glaze, and when dry is fired in what is termed the 'glost oven.' The articles to be fired are first carefully packed in oval coarse boxes or deep trays, made of strong fire clay, and termed 'saggers,' which are piled one on the top of another in these ovens. After dipping in the glaze it is cleaned by rubbing, and in this process much dust arises. This glaze is made of lead, zinc, hydrochloric acid, clay, etc., which is chiefly injurious by reason of the lead it contains.

"Salt-glazed ware is fired sometimes in open kilns. 'The workman judges from the aspect of the contents of the kiln when it is in a proper condition for salting, and then salt is thrown in with a shovel,' at several points. An abundance of white fume escapes during the salting process, for about twenty minutes after each salting, and passes

off by the chimney. It is the smoke that, in ordinary pottery-making, (earthen-ware, china, parian-ware, etc.,) occasions nuisance. The stacks are not high and much of the smoke reaches the ground. The enamel ovens have still lower chimneys. This fouls the skin and clothing, is not good for the breathing apparatus, and, although not directly causing disease, is not favorable to good health."

The result is not so serious here, as soft coal is not generally used. The smoke from salt glaze has a more special effect. It is acid and irritating to the organs of respiration, especially those of persons who are suffering from pulmonary affections. It is said to produce in such persons a sense of oppression at the chest, bronchial irritation and cough. The fume consists in a great part of salt, but it also contains hydrochloric acid. It is practicable to reduce very greatly any nuisance from pottery ovens and kilns, as has been done in many places in England. Both in the interests of workmen and of the people of pottery towns, there is need that wherever this becomes a nuisance it should receive sanitary attention.

All the facts as to the perils of this industry point to impalpable dust, constrained positions and sudden alternations of heat and cold, as the causes of shortened lives and of pulmonary diseases so common as to have made the "potters' asthma" a designation for a class of chronic ailments which kill many and are life-long to many more. These causes so far admit of removal or amelioration, and are so destructive in their character that the means of proper cleansing, ventilation and heating, the management of dust and the details of method should be closely inquired into. In no department in our State is there more need of close inspection and of such law as will relieve this skillful working class from evils alike destructive of life, of health and of prosperity.

SUMMARY OF REPORTS FROM LOCAL HEALTH BOARDS.

In October of each year a printed schedule of inquiries is sent to each local Board of Health in the State. The schedule of subjects is as follows:

A. Location, population and climate.
B. Geology, topography and contour.
C. Water-supply.
D. Drainage and sewerage.
E. Streets and public grounds.
F. Houses and their tenancy.
G. Modes of lighting.
H. Refuse and excreta (how managed).
I. Markets.
J. Diseases of animals.
K. Slaughter houses and abattoirs.
L. Manufactories and trades.
M. Schools and school and other public buildings.
N. Almshouse hospitals and other charities.
O. Police and prisons.
P. Fire guards.
Q. Cemeteries and burial.
R. Public-health laws and regulations.
S. Registration and vital statistics.
T. Quarantine, or care over *contagious* diseases and vaccination.
U. Sanitary expenses.
V. Heat and ventilation for dwellings.
W. Diseases of the year.

Other subjects may be named under X, Y, Z. The subjects may thus be referred to by the letters.

If the sheet provided is not sufficient, add others, marked with the letters.

In addition, Circular XXXIX., to be found in this report under the heading *Circulars*, with its suggestions and questions, is sent to each Assessor for the Board, and should be now referred to by the reader. It is not necessary to repeat each year these reports, but to select from them such parts as the Board may deem of local or general value for publication. Those from which no abstracts are made often contain information of value to the Board, and such as much aids in correspondence. While some Boards exist only in form, others are very efficient. Sometimes the Assessor or Board Physician shows great diligence in promoting the general health, and in informing

themselves as to local causes of disease, where other members of the Board give it little attention. Like school trustees, such persons are of very great service to the communities in which they dwell. By reading and observation they come to recognize sources of disease, and often, by advice and suggestion, appreciate the health of the community.

No one can carefully read over the summary we here present without seeing the value of such inquiry and observation, and the careful reader will, from it, obtain many hints as to the work which Health Boards can accomplish. We place the report of the Health Board of Paterson out of its regular order, and give it nearly in full, because it is so near to furnishing an outline of what city health administration is or should be. Other examples will be found in the summary of local Boards of smaller precincts, which are doing much to oversee and regulate the local health interests. The yearly reports we now have in hand cover almost every township of the State, and give most valuable information as to all the topics embraced in the schedule of inquiry.

FIRST ANNUAL REPORT OF THE BOARD OF HEALTH OF THE CITY OF PATERSON.

October 1st, 1883.

EZRA M. HUNT, M. D., *Secretary State Board of Health:*

Organization.—The Board of Health of the city of Paterson was established under the provisions of the State laws relating to the public health, by an ordinance passed by the Board of Aldermen November 13th, 1882. On the same date, the Mayor, David T. Gillmor, Esq., nominated Dr. Elias J. Marsh, Dr. John Quin, Mr. Henry L. Butler, and Mr. James Beggs, who, with the Health Inspector, the City Physician and the Registrar of Vital Statistics, should constitute the Board of Health. The Board organized on November 16th, 1882, by the election of Dr. E. J. Marsh as President, and the adoption of rules for its government. Mr. Henry L. Butler was elected Secretary *pro tem.;* subsequently Mr. John J. Warren was elected Clerk, as required by the State laws, and Secretary, as required by the city ordinance. Dr. William K. Newton was appointed Health Inspector for three years.

Work of Board—Among the first acts of the Board was the adoption of "An ordinance respecting contagious diseases." This was made necessary by the existing epidemic of small-pox. Subsequently an ordinance concerning nuisances, one relating to the food-supply and one concerning tenement houses, were adopted. These ordinances, the result of much study, not only point out and prohibit violations of sanitary laws, but serve the purpose of educating the people in matters pertaining to the health of the city, and, although not perfect, have proved of great value. They will be amended, from time to time, as may seem necessary, and will finally be made into a code.

Meetings.—Regular semi-monthly meetings, to the number of twenty-three, have been held during the year, and special meetings were called when necessary. Early in the year, the time of the Board was mostly taken up with the management of the

small-pox epidemic, the care of the city hospital, public vaccination and like duties. As a brief resume of the year's work will be given further on it need not be referred to here.

Rules of the Board—Meetings.—Regular meetings of the Board of Health shall be held on the second and fourth Tuesdays of each month, at 8 o'clock P. M., unless otherwise ordered.

Quorum.—A majority of the Board shall constitute a quorum for business.

Committees.—The standing committees of the Board shall be four in number; shall consist of three members each, and shall be appointed by the President. The standing committees shall be as follows: Sanitary Committee, Law and Ordinance Committee, Finance Committee, and Conference Committee.

Sanitary Committee—To the Sanitary Committee shall be referred all subjects of a scientific or medical nature, and it shall supervise the vital statistics and mortality reports.

Finance Committee.—The Finance Committee shall audit all bills and accounts.

Conference Committee.—To the Conference Committee shall be referred all business with the Board of Aldermen.

Law and Ordinance Committee.—To this committee shall be referred all subjects of law and ordinances.

Order of Business.—1. Reading of Minutes; 2. Report of Standing Committees; 3. Report of Special Committees; 4. Reports from City Counsel; 5. Reports from Police Department; 6. Report of Health Inspector; 7. Communications from other sources; 8. Resolutions; 9. Unfinished Business; 10. New Business; 11. Hearings.

Resolutions.—All resolutions shall be submitted in writing.

Hearings.—Any person feeling aggrieved at the official action of the Board or any of its members, or of the Health Inspector, shall be entitled to a hearing before the Board. *Office Hours.*—9 A. M. to 1 P. M., and 2 P. M. to 4 P. M.

Expenditures.—No expense shall be incurred by any member or officer without an order of the Board, but in emergency expenditures may be made to the amount of $25 upon an order signed by the chairman and one member of the Finance Committee.

Reports.—The Health Inspector shall make a report at each meeting; the Registrar of Vital Statistics shall report monthly, or when otherwise required.

Permits.—1. All permits authorized or required by ordinance of this Board shall be given in the name of the Board.

2. The Health Inspector is authorized to grant permits under sections 3, 4, 5 and 8 of the ordinance respecting contagious diseases, and under section 8 of the ordinance concerning the food-supply, and under section 17 of the ordinance concerning nuisances: he shall record the name, residence or the place of business of the applicant, and the character of the permit granted; he shall also report to the Board all permits granted or refused.

3. All other permits required by ordinance of the Boord shall be issued upon orders from the Board, and shall be countersigned by the Secretary.

4. Applications for permits under sections 1 and 10 of the food ordinance, and under sections 7, 8, 9 and 12 of the nuisance ordinance, shall be made in writing to this Board, and the Health Inspector shall inspect the business, matter or thing for which the permit is sought, and shall report to the Board at the next regular meeting the result of such inspection. All permits provided for in this section shall be issued and signed by the Secretary.

5. The Secretary shall keep a record of all permits granted by him and of all applications in case of refusal, including the name and residence, or place of business, of

each applicant, the date of the application, the business, matter or thing for which the permit is asked, and the action of the Board, if any, thereon, and such facts as may be necessary for a complete record of each application.

6. Permits when granted shall be good until revoked, but any permit may be revoked by the Board for cause.

7. *Cows.*—No more than one cow shall be allowed to be kept on any city lot on which a residence is built, and no cow stable shall be built at a less distance than fifteen feet from any house.

8. *Goats.*—When a permit to keep goats may be granted, it shall be understood that such goats shall be either kept within the premises described in the application or tethered on pasture, and such proviso shall be stated on the permit.

Contagious Diseases, Management.—1. A notice of infectious disease being received, the Health Inspector shall at once visit the house or put himself in communication with the reporting physician, as he may deem necessary; he shall see that the family receives the printed circular of the Board giving necessary instructions regarding the danger of contagion, the method of disinfection, etc. He shall keep observation of the case until its termination.

2. The Secretary shall notify the Board of Education, or the principals of private schools which the sick children may attend.

3. The Registrar of Vital Statistics is required to notify the Health Inspector whenever a certificate of death from scarlet fever or diphtheria is received by him.

4. The Health Inspector may give a permit allowing the children to attend school, after he is satisfied that there is no reasonable danger of carrying the disease; he shall give no such permit, however, in less than thirty days from the beginning of the sickness, unless the case may have been terminated by death or removal of the patient from the house, and in such case he may give a permit as soon as the house shall have been fumigated.

5. A suitable person shall be employed by the Board to take charge of disinfection and fumigation, under orders from the Health Inspector; he shall, when required, visit houses infected with contagious diseases, and instruct the family in the method of disinfection. At the termination of the case he shall disinfect the house or the room infected.

(NOTE.—Exposure of the corpse or public funeral is forbidden by ordinance.)

Expenditures.—The Board was under great and unusual expense during the months of November, December and January; the city hospital and the various measures necessary for the checking of the small-pox epidemic were a constant but unavoidable drain on the treasury, but the demands were liberally met by the city government. From November 17th, 1882, to the end of the fiscal year, March 20th, 1883, expenditures were made to the amount of $5,153.49.

Appropriation, 1883-84.—An appropriation of $3,500 was placed to the credit of the Board, for expenses during the fiscal year ending March 20th, 1884.

(Although this report is made for the year ending September 30th, 1883, it must be remembered that the time covered by it is but ten and one-half months. The work, as previously stated, did not commence till about November 17th, 1882.)

Nuisances.—During the time embraced by this report 529 nuisances have been abated. These nuisances were caused by filthy privies, cesspools, gutters, yards, or some one of the numerous forms of filth. It does not seem necessary to particularize the different varieties, but the aggregate will give an idea of the amount of work done. The following method is employed in the abatement of minor nuisances:

In no case is a report accepted without investigation by the Health Inspector, some

employe of the Board, or a police officer. It was early learned that complaints made by people were, in a large proportion of cases, unreliable, and that the Board was to be used for purposes of revenge, or to aid in a landlord-tenant fight, or to assist in some neighborly contest.

Not ten per cent. of the nuisances abated were discovered by reports made to the Board by tenants or others, but house to house inspection by the Inspector or notification by police officers revealed the cause of ill health or annoyance.

An inspection of the premises having been made and the nuisance discovered, a notice is sent to the responsible person requiring him to cause the abatement thereof within a stated time. An exact copy of the notice is kept in the office, together with notes as to when the time expires, etc. At the expiration of the stated time a re-inspection is made. If the nuisance has not been abated a complaint is immediately filed with the Recorder, who issues a warrant for the arrest of the culprit. When brought before the Recorder, the defendant is directed to attend to the order of the Board, or a light penalty is imposed.

In the case of filthy privy-vaults or cesspools, no re-inspection is necessary, for a permit is required before the scavenger can empty a vault; the stub of this permit records the date of abatement and hence checks off the notice sent.

All notices quote the section of the nuisance ordinance that is violated, thus informing the person notified just what is expected of him.

As to complaints, not more than thirty have been filed before the Recorder, and fines not to exceed fifty dollars in all have been imposed. A rigid system of inspection and close watching have enabled us to insure the abatement of nuisances without much litigation. But two trials have been held during the year.

Privies.—Of all the forms of filth which we have to combat, the stored-up filth in privy-vaults is the most annoying and probably one of the most fruitful causes of ill health, and we shall have accomplished a great deal towards making the city healthful when we shall be able to limit, or prohibit, the use of the leaching vault. It has been the custom in Paterson, heretofore, for persons to manage matters of this kind as their ideas of economy or convenience might suggest, and it will take a long time, and compulsion will have to be employed, to remedy this great evil that has existed for the past thirty or forty years.

Of the 7,000 vaults in the city, we venture to say that not more than 500 are water-tight, properly constructed or emptied at frequent intervals. All kinds, sizes and forms are in use, from a hastily-dug hole in the ground to an elaborately-constructed vault, with its walls built up without cement or mortar, with a porous bottom, and all in a more or less filthy condition.

Sections of the nuisance ordinance regulate the building of vaults and require that no vault shall be constructed of any material except brick; shall be at least eight inches thick; shall be water-tight, and shall not be more than six feet deep. It is also provided that the filth shall not be permitted to rise within two feet of the top of the vault. These restrictions have accomplished much good, but we are compelled to acknowledge that we have not yet made the advance we had expected or desired. We feel that we should have increased power to pass ordinances regulating the capacity, the construction, the method of emptying and the frequency of emptying vaults. The nuisance ordinance does not cover the subject, for too much time is consumed in the work of inspecting, and it should be the rule that all vaults should be cleaned at least once each year.

Much of the time of the Inspector has been taken up in his endeavor to abate this great nuisance, and, notwithstanding the fact that 782 vaults have been emptied this

year, there yet remains vast quantities of filth capable of polluting the air and the ground and rendering them hurtful.

To give an idea of the neglect that has prevailed we will state that many vaults had not been cleaned in five, ten and even fifteen years, until ordered emptied by the Board. Without dilating more on this subject, we will state that some rigorous method must be adopted to enforce cleanliness.

Paterson being situated in the center of a rich farming country, it seems necessary that the enormous quantities of organic waste of its 56,000 inhabitants should, to a certain extent, be restored to the land, else the farms be impoverished. Hence, for economic reasons alone, the compost should not all, even if it were possible, be disposed of by water-carriage. At least 18,000 of our population have no sewerage provided for their use, and there must, therefore, be frequent removal in order that a nuisance be not created. This we think possible, if frequent removal be insisted on and made compulsory. Perhaps the city might be induced to take charge of this, as is done with the garbage.

Cesspools.—The number of cesspools in the city is not large. Probably the First and Second wards, where but few sewers are laid, suffer more than the rest of the city from this evil.

The Board, by a vote, discountenanced the building of cesspools, and argued that it was better to allow the slops to flow into the gutters, where it could be washed away either by the rain or flushing, than to encourage the storing up of liquid filth on the premises. Cesspools are placed under the same restrictions as privies, and must be emptied by an odorless excavating apparatus.

Scavenging.—We found scavenging conducted on the usual primitive plan; that is, removal in carts at night, with little or no precautions. An ordinance was adopted requiring the odorless apparatus to be used in all cases where possible, and when that could not be done, tight-covered barrels are insisted on. No vault or cesspool may be cleaned without a permit from the Board. This serves as a check on the work, and serves to record the amount of work done. An improvement, which seems important to us, was introduced, that was the granting of permission to do this kind of work by daylight, for the reason that the work would be more thoroughly done and subjected to proper supervision. Not only was permission given to work during the day-time, but it was encouraged, and now nearly all vaults are cleaned between 6 A. M. and 8 P. M.

Cattle.—The evils arising from the herding of a large number of cattle in the built-up portions of the city were soon recognized, and ordinances and rules were adopted leading to the checking of this practice. It was argued that not only was this a serious nuisance, but that the health of the cattle was impaired, and the milk-supply rendered either dangerous or poor in quality.

These facts being taken into consideration, the following sections of an ordinance were adopted:

No person shall keep cattle in the city without a permit, and no person shall keep a greater number of cattle than is stated on a permit. No permit is granted to keep more than one cow to a city lot (2,500 square feet) on which a dwelling-house is built, and no cow-shed shall be nearer than fifteen feet to a dwelling.

There was more resistance offered to this action of the Board than to any other measure adopted. Many people had collected cows around their houses for years, and did pretty much as they pleased. It was found, on inspection, that as great a number as seventeen were stabled on a city lot, on which was a dwelling-house, sheds and other outhouses. Ten was a frequent number.

The applications for permits were rigidly and carefully scrutinized by the Board, and were only granted after inspection. About 139 permits to keep 361 cows have been granted, and permission to keep 150 head of cattle refused.

Swine.—Only five permits to keep swine have been granted.

Fowls and Goats.—326 permits have been granted to keep fowls or goats, after inspection of the premises, with the proviso in each case that if any nuisance is caused the permit shall be revoked. Permits for goats are only allowed when the applicant promises to keep the animals within an inclosure or tethered on pasture.

Garbage.—The collection of ashes and garbage is made twice each week in the summer, and once a week in the winter, by the city carts. About $8,000 was spent in this work during the year, and a like appropriation has been made for next year.

The garbage and ashes, which are generally mixed, are dumped upon low land and sunken lots within the city limits, large areas of land having been leveled by this method. Part of the land thus made is indicated by red × × × on the accompanying map.

Knowing that land thus made is not fit to be used for building sites—at least for years to come—the Board has strenuously labored to stop the dumping of refuse organic material in the city, and in this it has been partially successful, and now more care is observed in the choice of dumping grounds.

Many methods of remedying this difficulty have been talked over; the separation of the ashes from the garbage by the householder has been advocated, but this will be almost impossible to carry out in the tenement-house districts. Even if separation was carefully done, the disposal of the garbage would still present obstacles to a proper working of the plan. Cremation has been mentioned, and has the indorsement of the Board. This is done in Leeds, Manchester, and other English cities, and no doubt a "destructor" would work well in Paterson. It would probably cost $10,000 for the plant for a city the size of ours.

If each family would burn its own organic waste—which readily can be done daily—the problem would be solved, and the ordinary inorganic refuse of the household could easily be disposed of.

Slaughter-houses.—Three applications have been made to the board for permission to maintain slaughter-houses; one permit was granted, one refused, and the other application is now before the Board.

Careful inspection is made in each case, and when there is the least possibility of a nuisance being created, or where there is no proper arrangement for the disposal of blood and offal, the permit is refused.

At present, at least eighty per cent. of the meat-supply comes from Chicago, already dressed, in refrigerator cars, and very little slaughtering is done here. A few beeves, calves and sheep are killed by the local butchers.

The offal from the butchers' stores is collected by one man, and the work is done only in a passable way. The regulation of the trade is now under discussion.

Kerosene.—The sale of illuminating oil has been closely watched. Forty-five samples, collected from all parts of the city, have been examined, and all proved to be of good quality. Much of the oil sold is of the highest grade.

The State law regulating the sale of kerosene has certainly done much good.

Water-supply.—Our water-supply is derived from the Passaic river, wells and cisterns. We have endeavored to estimate the proportion of the population using water from each of these sources, but only approximate figures can be given.

From notes furnished the writer by the Superintendent of the Passaic Water Com-

pany—a private corporation, owning the water-works—it appears that about 3,500 takers, or houses, pay for water, many factories and dye works being included in this estimate. As one dye works alone takes water from four 4-inch pipes, it can be seen how futile it is to calculate the amount used per capita.

But we may safely say that about 35,000 people use the Passaic water for domestic purposes, and that about 100 gallons per head per day are consumed. The remainder of the population depend on wells, cisterns being used by a very few people.

As to the quality of the water, from the sanitary standpoint, it can be said that the Passaic water is all that can be desired. This opinion is not rashly formed without good foundation, but it is the opinion of Professor Cook, State Geologist, Professor Leeds and others. The analyses made by Leeds and others show that the organic ingredients indicative of pollution are in very small quantities. In fact, there is no source of pollution above the point at which the water is taken to supply the city except the town of Little Falls. This is a small manufacturing town, about three and one-half miles above us, with no sewer system, and discharging into the river little organic waste and moderate amounts of refuse from dye works.

Between the two places the river runs a tortuous course, and ample opportunity is offered for the oxidation and dilution of any organic matter put into it. For the future, when Little Falls shall increase in size, we cannot speak.

We are now anxiously watching the encroachments of our city on the banks of the river above the pumping station, for contamination from that source is feared. Not a little trouble has been caused already by the slop-water flowing down the sloping streets in the western parts of the city into the river, but this has been checked by vigorous measures carried out by the Board.

During the continued hot weather of July and August the water sometimes has a disagreeable odor and taste. This is due to the fact that some of the lower forms of vegetation are killed if the temperature of the water rises above 60° F., and some days it rose as high as 70°; but we are unable to trace any sickness to this trouble.

The water company does its work to the satisfaction of the consumers, and tries to keep up with the demands.

Of the public wells we cannot speak with the same degree of confidence.

At least 15,000 people depend on wells for their drinking-water. The Board has prepared a list of the public wells—that is, wells cared for by the city government—and it is found that there are 102; private wells, if added to the list, would no doubt swell the number to four times that given.

The city spends from $1,300 to $1,500 each year in the care of public wells and pumps.

In considering this subject, the large area of the city and the sparsely settled suburbs where the water mains are not laid must be thought of, and due allowance made. But there is no excuse for the existence of wells in parts of the city thickly populated and supplied by the water company.

It is only the obstructive conservatism of many of our people that will explain the adherence to old and polluted wells, and this class resist all interference with the water-supply that they have been satisfied with for the past fifty years.

Constant agitation of the subject, with unimpeachable evidence, will do much towards closing the dangerous or doubtful wells.

The public wells are, as a rule, located under the sidewalks and on a line with the gutter, where every opportunity is offered for the inflow of surface-water and slops, and the filth-sodden condition of the ground in the older parts of the city, the leaky sewers and leaching privy vaults and cesspools offer the best chances for the wells to

become polluted with filth. That there is not more sickness directly traceable to the use of city well-water, can only be explained by the fact that a certain degree of filth contamination seems necessary before a water is made dangerous.

We are watching this subject very closely, and are prepared to close all wells unfit for use. The Health Inspector is now at work, making analyses from time to time, so that we shall know just where to look for pollution.

Food-supply—The markets were watched for some time to stop the sale of unsound meat. About 1,500 pounds of immature veal and 2,000 pounds of unsound beef were seized. The work has lagged, however, because of the difficulty of obtaining a competent man to take charge of meat inspection. The system of inspection will be resumed this fall.

Milk.—The milk-supply of the city has been so closely watched, for the past three years, by the State Inspector of Milk, that it is now in a very satisfactory condition. The milk law has done much good here.

A book is now kept in the office of the Board, in which the name and residence of the dealers, and the source of milk sold, are recorded. It is our intention to note the result of inspection, the breed and condition of the herd, the feed used and other facts of value. There are about 120 dealers now recorded, and the history of each is more or less known. It would be a wise provision if local Boards were empowered to compel the registration of dealers.

Tenements.—The inspection of tenement houses has not been done systematically, cases of flagrant violation of sanitary laws only being noted. According to the United States census of 1880, there were 6,712 dwellings in Paterson. This number has been increased to at least 7,000, for probably 400 new buildings were erected in 1881, 1882 and 1883.

A glance at the accompanying table will give an idea of where Paterson stands respecting the population of each dwelling:

City.	Persons to Each Dwelling.	Dwellings.	Number of Families.
Camden	5.05	8,246	8,772
Philadelphia	5.79	......	......
Newark	7.26	18,796	28,386
Paterson	7.60	6,712	10,679
Jersey City	8.59	14,049	23,957
Hoboken	11.50	2,695	6,717
New York	16.37	......	......

It will be seen that our city stands about midway between Philadelphia, the city of homes, and New York, with its overcrowded tenement houses.

The number of overcrowded houses is small. Two-story dwellings predominate, occupied in many cases by the owner, who rents one floor to a tenant. There are a few tenement houses built on the plan of a great city, with little land to spare, and we regret that the tendency to erect houses on this plan is rapidly becoming popular with landlords. As land in the center of the city increases in value the proportion of high buildings, with but little surrounding ground, will multiply.

There is a vast amount of work for the Board to do in this line of sanitary reform. Our tenement house ordinance is but a feeble attempt at legislation and will be perfected soon.

Sewerage.—The accompanying report of the city officers for the fiscal year ending March 20th, 1883, contains the report of the City Surveyor. By reference to his

report (page 97) it will be seen that 21.67 miles of sewers had been laid prior to that date, since then enough has been laid or contracted for to swell the total to 24.50 miles. The reports also give the sizes, shapes and material of the sewers. I have roughly indicated on the accompanying map, in blue lines, the situation of the principal sewers and the points at which they discharge.

The Broadway sewer, now under contract, will be of great service to the city. It is about one mile long, and the greater part of it runs through either swampy, water-soaked or undrained land. The easterly portion of the city, through which it passes, has been noted for the prevalence of malarial troubles. This has checked the growth of what will, in the future, be a popular section for the better class of homes. We venture to predict that, within two years, the ground will be thoroughly drained by this sewer and rendered salubrious. This opinion is based on our experience with the sewer laid about two years ago in Clay street. The neighborhood through which the latter sewer runs was swampy and water-soaked. To-day the land is comparatively dry, and will be built on in a few years.

The Second ward, with a population of 6,000, has no sewers, and, in the First ward, (population 5,500,) only a few short sewers have been laid. These two wards are in danger of soil pollution from the privy-vaults and cesspools.

The First ward has been mapped, and sewers will be laid as demanded, or as the finances of the city will permit.

The Second ward sewerage system will be a problem hard to work out, for the district is mostly on very high ground and on a line with the river above the pumping station. Hence, careful plans will have to be devised to carry the sewage below the falls.

The sewer system of this city is being very carefully mapped out, and we shall not again make the mistake, as was done years ago, of building them too small to carry off the surface-water. The rainfall in Paterson is enormous at times, and this was not taken into consideration when some of the older sewers were built.

The government desires to build carefully and within its means, without placing too heavy a debt on the city. All our sewers discharge into the Passaic river within the city limits. The river at present, at ordinary flow of water, is capable of taking care of the sewage, but during a drought it is pressed to its limit. An interesting question for the future to decide is how long will the river take up the filth poured into it and when will its saturation point be reached? This vital question we will not here debate, but at some future time it will be taken up for discussion.

House Connections.—As a rule, house connections with sewers are very carelessly made. The work is generally done by laborers, without supervision, and the sole object seems to be to get the job done as quickly as possible, ignoring all ideas of perfect workmanship.

Connections are made by means of six-inch earthenware or cement pipes, and join the main sewer at varying angles.

To give an idea of the lack of care prevalent in this important work, we will mention two cases brought under our notice. In one case, the workman could not find the stub on the sewer, and, being too lazy to get information from the proper person, he started the house-drain at the side of the sewer and filled up the trench. The reason why the waste from the house did not run off was discovered six months after the drain was laid. In another case, the laborer encountered a bowlder in the trench, and, for economy, this was not moved, but a piece of the drain was laid on each side of the stone. This was not discovered till months after.

The pipes are put into the trench without system, without alignment, without making joints, in short, in any way to get the job done and the trench filled up.

It is recognized that something should be done, but there appears to be no authority to take charge of the work.

The Board of Aldermen conferred on this Board power to order connections with the public sewer when necessary for the public health. Over 200 have been ordered, but we have no authority to superintend the work or regulate the quality.

Plumbing.—It was well known that the plumbing in the houses, and that being put in, was faulty, or even dangerous to health, and a series of recommendations, embodying the best plans for house-drainage, were adopted by the Board, published in the newspapers, and a copy sent to each plumber. This did a little good, but compulsion seems to be necessary in order to insure good workmanship.

All houses of any pretension now building in the city, and about 250 houses already built, have been inspected by the writer, and he regrets to say that in but one of the new houses were the recommendations followed out, and in all the older houses the plumbing was faulty or dangerous.

It is the opinion of the Board that it should have power to compel the registry of plumbers, to regulate the plumbing construction, to require plans to be submitted to it, and to enforce a system of safe plumbing and drainage. This opinion is indorsed by about twenty plumbers, who need protection from dishonest or unskilled competitors.

Infantile Diarrhœa.—Diarrhœal diseases among the children were very prevalent in August, and twenty children under five years of age died therefrom in that month.

A circular was prepared, giving rules for the management of children during the summer months. 8,000 copies, printed in English and the Holland language, were distributed.

Contagious Diseases.—Rules for the management of cases of contagious diseases, adopted by this Board, are given in a former part of this report.

The general plan pursued with cases of scarlet fever and diphtheria is as follows:

Notice from the attending physician being received, the name, age and address of the patient, and the name of the disease, are entered in a book kept for that purpose. If the patient is a pupil at a school, the principal is immediately communicated with, by means of telephone, and all members of the family, and, in some instances, all children in the house, are kept from school. The Health Inspector then visits the house, or communicates with the attending physician, as may, in his judgment, suffice.

A circular, giving instructions as to the contagious nature of the disease and as to the methods of disinfection, is sent to the house.

Upon recovery of the patient—but never under thirty days—the house is fumigated and a permit given to attend school. In case of death, public funeral is forbidden, and the undertaker is instructed either to place the body in an air-tight coffin or to wrap it in a sheet saturated with a solution of sulphate of zinc, and not thereafter expose it under any circumstances. The house is then disinfected.

This plan has been pretty closely followed out, but we are not yet in a position to state whether or not it has done any good, or checked the spread of these diseases.

The physicians, without exception, are very careful to report cases and deaths, and not a solitary instance of refusal to report can be noted. We have never heard from a physician a complaint as to compulsory notification.

If any case has not been reported, it can be accounted for by lack of care or because it was not seen by any physician; in either event, the board is pretty certain to hear of it from a neighbor, so that we think the record is quite complete.

The writer is of the opinion that not much can be done to prevent the spread of

scarlatina and diphtheria until we treat the cases as we do those of small-pox—that is, isolate, quarantine, or remove to a hospital. This cannot be done here for two reasons—public opinion does not reach that pitch, and we have no properly appointed hospital to which cases can be taken.

Measles.—No attempt is made to manage measles, because we recognize the impossibility of limiting the spread of that extremely contagious disease.

The only restriction placed on these cases is to keep the children in the family out of school until complete recovery.

Cases Reported to the Board.—(The system of notification was first employed on November 26th):

Scarlet Fever.—1882, December, 8 cases; 1883, January, 14 cases; February, 13 cases; March, 19 cases; April, 40 cases; May, 48 cases; June, 26 cases; July, 30 cases; August, 34 cases; September, 45 cases. Total, 277 cases. Deaths, 29.

Diphtheria.—1882, December, 1 case; 1883, January, 7 cases; February, 4 cases; March, 1 case; April, 4 cases; May, 8 cases; June, 0 case; July, 1 case; August, 6 cases; September, 10 cases. Total, 42 cases. Deaths, 5.

Small-Pox.—Paterson has had a dire experience with this disease, but so recent is its history that we do not feel called upon to relate it at any length.

Prior to the formation of this Board, November 16th, 1882, there had been 138 cases in the city, extending over the time from July, 1882, to that date.

Coming as it did when the city was unprepared for it, and when the machinery for its management was not complete, it made rapid headway. The people were fully persuaded that the Board of Aldermen was not the proper body to legislate cn public health matters, and, yielding to the press of opinion, the Board of Health was formed.

When this Board was organized, measures were immediately taken to rid the city of the epidemic.

The city, when the epidemic burst upon it, had no hospital, save a small building capable of accommodating about eight patients, and, under the press of circumstances, a larger hospital was built. This has been somewhat modified and rebuilt upon plans furnished by this Board, and although it is not what we would have erected, yet it answers its purpose very well.

The hospital buildings are at the extreme northwesterly limit of the city, and are built of wood.

The main hospital building will accommodate comfortably about eighteen patients. Ventilation is provided for by means of sheet-iron tubes surrounding the stove-pipe and passing up through the roof; also by an arrangement fixed on the window-sash. We found this to work well.

The city is now better provided with hospital arrangements than ever before, and if money was furnished the hospital could be used for the treatment of other contagious diseases.

The following number of cases of small-pox were noted during 1882 and 1883: Prior to the formation of the Board, 138 cases; November, 1882, 13 cases; December, 1882, 31 cases; January, 1883, 3 cases; sporadic case from Philadelphia, April 15th, 1883, 1 case. Total, 186 cases.

Deaths.—August, 1882, 1; September, 14; October, 11; November, 9; December, 2; January, 1883, 1; April, 1. Total, 39 deaths.

A brief account of the method of managing a case may be of interest:

A notice being received, the Health Inspector immediately visited the house. If the case could safely be isolated in the house, arrangements were made for strict quarantine, and the family were made to understand that it was only by favor that the

patient was allowed to remain in the house and not be taken to the hospital. They were also informed that any breaking of quarantine would be followed by quick punishment. Quarantine at home was only allowed where but one family occupied the house.

Every person in the house, except the sick, was immediately vaccinated. As a rule, two insertions were made, and the people in the neighborhood were offered free vaccination. A placard was placed on the house, warning all not to enter or leave the house, except the attending physician and the Health Inspector.

Upon recovery of the patient, he is given a thorough bath and new clothes are put on. The bedding is removed in the ambulance to the hospital grounds and burned; sheets, blankets and underclothing are soaked in a solution of sulphate of zinc, the room and all the clothing are then fumigated by burning sulphur for twenty-four hours.

If it is impossible to isolate the patient at the house, the ambulance is immediately sent for and he is removed to the hospital, together with the bedding. Any clothing left in the house is disinfected with the zinc solution, and the house fumigated with sulphur. All in the house are vaccinated and also persons in the neighborhood, and strict watch is kept of the premises until the period of incubation has passed.

When the patient recovers he is treated as before stated.

In case of death the corpse is wrapped in a sheet soaked in a solution of sulphate of zinc and salt, and buried as soon as possible.

This method worked admirably and no extension of the disease took place from house to house.

Vaccination.—Two reputable physicians were employed, at a salary of $100 a month, to visit every house in the neighborhood of small-pox cases, and more than 4,000 were carefully vaccinated and re-inspected at the end of eight days. A complete record has been kept of all vaccinations done under authority of the Board. This record includes name, age, address, whether primary or secondary, how long since vaccinated, the virus used, and the result of the vaccination.

Virus Employed.—We used only virus bought from Martin and the New York Health Department, and got excellent results. Much of the success can be accounted for by the care with which the work was done. Ninety-six per cent. of primary vaccinations were successful.

Sporadic Case.—A case occurred in April, in the person of a man from Philadelphia, whose family had but recently come from the small-pox hospital in that city. The origin of this case we never satisfactorily traced, but there are no doubts that there was carelessness in disinfecting the bedding at Philadelphia.

The man had hemorrhagic small-pox and died on the second day of the eruption. No second case occurred.

We have thus briefly sketched the rules by which we work, for they have proved of great service.

Vital Statistics.—We regret that the Bureau of Vital Statistics is under the control of the city government, and the books and returns are not available for our use. The Registrar is very obliging, but, as he is not a physician, he is not competent to elaborate the returns so as to be of any benefit to us. We must refer you to the returns sent you by him.

Area of Paterson, 8.36 square miles; 5,357 acres. Area built on, not one-half. Latitude, 40° 55′ N. Longitude, 74° 10′ W. Elevation above sea-level at Sandy Hook, (at City Hall,) 87 feet. Population, census of 1880, 51,031. Estimated population, October, 1883, 56,500.

Our relations with the other branches of the city government have been harmonious, and we have received valuable aid from the Police Department.

We have been fortunate in securing for our clerk, ex-Recorder John J. Warren, who, from his large acquaintance with people and places, has been of inestimable value and has aided us greatly.

Recommendations.—We would recommend to your Board that a supplement to the health law be drawn up and introduced in this winter's Legislature, giving local Boards the following powers:

1. To ordain regulations for the construction, location, emptying and maintenance of privy-vaults and cesspools: to require emptying at stated intervals.
2. To ordain regulations for plumbing and drainage and sewer connections, and to require the registration of plumbers.
3. To require registration of milk dealers.
4. To close public wells if water is contaminated.

In closing, we will state that this report has only aimed at giving an outline of the work done. We feel that many of the subjects noted require two or three years more study before an authoritative opinion can be expressed thereon. Hence, the schedule sent by your Board has not been closely followed, but we hope in the future to take up several of the topics and exhaust them.

With this report we send the following: 1. A rough map of the city relating to some matters touched on in this report. 2. Copy of the ordinance of the Board of Aldermen establishing the Board of Health. 3. Copies of ordinances of the Board of Health. 4. Copies of blanks used by the Board. 5. Copies of circulars of information issued. 6. Copy of report of city officers for 1882–83. 7. Copy of report of Board of Education for 1882–83.

All of which is respectfully submitted,

WM. K. NEWTON,
For the Board of Health of the City of Paterson.

Paterson, October 11th, 1883.

ATLANTIC COUNTY.

ABSECON TOWNSHIP. - *Report from* E. H. MADDEN, M.D.

No contagious diseases have appeared in town this year, and it has been exceedingly healthy throughout.

The cellars are dry; no water ever appears in them. It is presumable there is no better locality in the State for cellars than in this place.

ATLANTIC CITY. *Report from* JONA. J. COMFORT, M.D., *Secretary.*

Two-thirds in number of the smaller cottages are using cistern-water. A small number rely upon wells. The remainder, including nearly all the larger hotels and cottages, are supplied with potable water, brought from the main-land and distributed through the city in cast-iron pipes. An iron stand-pipe, 132 feet high and 25 feet in diam-

eter, (capacity, 500,000 gallons,) maintains an equable pressure of 60 pounds to the square inch, a pressure available for fire purposes. This water is supplied by a company. It is clear at all times, and soft, being remarkably free from both organic and inorganic matter. Its source is from strong springs, reached by sinking a well thirty feet in diameter and thirty feet deep. This supply, ordinarily ample, can be augmented at any moment by drawing from a neighboring stream of pure water. The water has no taste of iron or other mineral. The pipes are cleansed at proper times.

Atlantic City relies upon surface-drains for surface-drainage, assisted by a few underground conduits. For sewage proper, a complete system of sewers is now under construction, to be built and operated under the West patent. The sewage of the city is to be collected into a large well, and thence pumped to a distance of four miles to a station, where the whole is to be deodorized and filtered, and the filtrate converted into fertilizers. The sewers are to be constructed of glazed terra-cotta pipe, with a fall in no case less than ten feet per mile, with pipes ranging from six inches and upwards in diameter, inside measurement. There is no separate system of drainage for the ground as distinct from sewerage. There are few or no cellars proper, and where there are basements they are not generally lived in. There are salt meadows in the rear of the city, but they are not found to be malarious.

Refuse or garbage is collected from house to house and removed from the city limits by the city, in sealed vessels. During the summer season, this is done daily. Privy-vaults are required, by the Board of Health, to be constructed with sides bricked up and cemented water-tight, the bottom open. They must be emptied each year before the first of May, and oftener when necessary, by the odorless system, and by parties designated in a permit from the Board of Health, and under bonds to perform the work according to their directions. The night-soil is required to be removed beyond the city limits.

There are no cemeteries or burial-grounds in the city limits. Interments are all made upon the main-land.

A Keeper of Vital Statistics has been appointed by the Board of Health from one of their number, and the returns are regularly made and recorded in a book kept for that purpose.

The Board of Health has a hospital for the reception and treatment of severe forms of contagious disease. The milder forms are subjected to domestic quarantine.

EGG HARBOR TOWNSHIP. - *Report from* J. B. SOMERS, M.D.

The water-supply is obtained chiefly from wells, and is mostly of a good quality and in sufficient quantities. The gently undulating character of the surface, and the porous nature of the soil, is adequate to secure, in most cases throughout the township, thorough drainage. I know of no sickness during the past year that has been attributed to this source. Malaria is not our heritage, but rather an importation, largely affecting our sea-going population and modifying the diseases incident to the locality. Where nature has so kindly done her part, no law has been invoked in regard to the drainage question.. The township, as yet, has no sanitary map, but it is highly essential that it should have, as an emergency may at any time urgently demand it.

In many cases, slop-water is deposited too near dwellings and wells for good sanitation, and water-closets cleansed only when necessity amounts to compulsion; the nightly accumulations of urine are too often left to stand until the air of the apartments is contaminated with its foulness; probably more ill health arises from these causes than most persons would be willing to admit. In addition, we would say that the garbage, which Atlantic City so generously disposes of, is brought to our doors, and reeks in the compost heaps, or is spread in fields adjoining residences and in villages.

"The offense is rank—it smells to heaven." Beside the annoyance of keeping the whole community in a continual state of nausea, if these are not hot-beds for the generation of all germinal diseases it would be difficult to say where they may be found.

There have been no veterinary diseases during the past year. We have but one slaughter-house in the township, situated in the village of Linwood. It has occasioned no offense.

The local Board has prohibited public funerals in all cases in which the physician's certificate indicates that the death has occurred from small-pox or scarlet fever, and are ready to enlarge the boundaries whenever, in their judgment, the public health is jeopardized.

The law respecting vaccination has been hitherto very generally ignored. Of the 1,038 children enrolled, over 350 have not been vaccinated. The Board has taken measures to notify the chairman of the Board of Trustees in each school district that the law concerning vaccination must at once be complied with.

There have been no especial diseases prevalent during the past year. We have but one public institution in the township—the county alms-house—which is very efficiently managed. During the past year there

has not been a death within its inclosures. I doubt if another such record can be shown since the county was established.

In conclusion, permit us to say that we think that the time has fully arrived when the township physician should have the entire sanitary supervision of the public schools. These are centers, whence too often emanates infection and contagion, and where the physical structure of the coming generations of men and women are too ofttimes wrecked for the want of some directing light. As important as is the office of the Superintendent of Public Instruction, it can scarcely be less so to have some functionary to guard the public health.

EGG HARBOR CITY. - *Report from* THEO. H. BOYSEN, M.D.

Water supply is, in most cases, now obtained from driven wells, which undoubtedly are to be preferred to the old open wells, because two or three clay beds are generally penetrated by the pipe, and thus a pure and uncontaminated supply is obtained which has never been known to fail, even in the driest seasons.

Excreta of all kinds are here composted and used as manures, which, owing to the porous nature of our soil, has as yet been without serious effect, but it is to be feared that, if continued as the country becomes more thickly settled and the soil impregnated, such affections as typhoid fever, which are at present almost unknown, and, when met with, of mild form, will become vastly more frequent and deadly.

Our school is now thoroughly equipped and furnished throughout with the most approved and health-preserving furniture. The doors have all been changed in order to comply with the law enacted last winter, and a Babcock fire extinguisher is kept in the building for use in case of emergency; in fact, the entire school is as perfect as can be desired, except in the matter of ventilation, which must be entirely effected through the doors and windows, thus causing draughts which are surely not conducive to the health of the children.

We are now about preparing a health code and ordinances governing all matters relating to public health, registration of vital statistics, quarantine, and sanitary expenses.

During the past year we have enjoyed a fair degree of public health. Of contagious and infectious diseases we had last winter a short run of measles, and, during the last month, a few cases of scarlet fever.

HAMILTON TOWNSHIP. - *Report from* D. B. INGERSOLL, M.D.

There have been no epidemics or special diseases during the year. We have had but few cases of *pure* typhoid fever, and yet there have been a few cases of such. We again have to report some cases of typho-malarial fever. None of these fevers have been of a severe form. A few cases of measles occurred at Weymouth, brought there by families moving into the place, yet these have been confined chiefly to those families.

We are glad that the last Legislature passed an act prohibiting the sale of tobacco to minors under a certain age. But this act is made of almost non-effect by its making the parent of the minor the prosecutor of the offense. In nine cases out of ten these parents will never prosecute. A supplement should be enacted that would correct this difficulty, by making it the duty of any one to prosecute.

We would also call attention to the danger that we of the rural districts are subject to by the allowing of dogs to run at large. They are permitted to run at large both day and night, and wander over the town in search of food; thus they are constantly in the streets, and liable to be bitten by any dog which may have hydrophobia. Should one of these dogs be bitten unbeknown to the authorities and be seized with hydrophobia, the evils that might ensue cannot be estimated.

BERGEN COUNTY.

PALISADE TOWNSHIP. *Report from* S. E. DEMAREST, *Secretary.*

The population of the township is a very stable one, so that there is but little change from year to year. The great majority of the houses are occupied by their owners, so that there is little moving from place to place, and the sanitary condition of most of the dwellings is well looked after. The cellars are used mostly for the storage of vegetables during the winter months, but in the spring they are generally very thoroughly cleaned out and ventilated.

RIDGEWOOD TOWNSHIP. - *Report from* THOMAS TERHUNE.

The chief nuisance is the standing and unloading of cars loaded with manures, in close proximity to the depot and public street.

UNION TOWNSHIP. *Report from* JACOB G. VAN RIPER, *Secretary.*

On the westerly side of the marsh-land is a ridge of high land, occupied as residences. This ridge of high land is sloping to the

marsh-land, consequently all the drainage and natural sewerage of the population flows in the creeks and ditches of the marsh-land. Formerly this ridge of high land was considered and known as a healthy location, but since the railroads and sluice companies have dammed and shut out the natural flow of tide-water in these natural drainage creeks and ditches, the drainage and sewerage from the high land make stagnant pools of filth on the borders of the high land. Fevers have been prevalent in dry seasons. As evidence and proof of the above, this season we had frequent rains, which purified these stagnant pools of filth. No fever. But as soon as the dry weather came, in August and September, fever cases were reported, and we may expect to have fevers every dry season, until the tides are allowed to flow in and out of these natural drainage creeks and ditches, to carry off these pools of filth.

BURLINGTON COUNTY.

FLORENCE TOWNSHIP. - - *Report from* N. A. BAKER, M.D.

Florence is located upon the banks of the Delaware river; has a population of about 1,100. The climate is variable. It has a large pipe foundry and about 200 tenement houses. The majority of these houses are in blocks, alleys between, with water-closets along the alleys in which barrels have been sunk; these, in many cases, overflow, making the atmosphere and surroundings very offensive.

The registration of statistics is cared for by a careful and painstaking assessor.

During the winter of 1882–83, we had what might properly be termed an epidemic of pneumonia, not of a very severe or low type, however, with no deaths.

Diphtheria we have constantly with us, but never as an epidemic. Cholera infantum, when it occurs in the foundry or tenement houses, is singularly fatal.

SOUTHAMPTON TOWNSHIP. *Report from* SAMUEL E. BRANSON.

We have a great deal of fever and ague.

EASTAMPTON TOWNSHIP. - *Report from* THOS. L. SHERMAN.

Our water-supply is from ordinary pumps, except in the village of Smithville, which is supplied by a force-pump from the shops and

ordinary pumps and wells; about twelve houses have hydrants in them. The water is very good; the hydrant-water is soft and not fit to drink in summer, but good in winter. It is pumped from the Rancocas creek, with no sewage emptying in it of any account.

Drainage is very good. Cellars dry. No swamps; but malaria is frequent when the creek is low, but that will be prevented hereafter. The H. B. Smith Machine Company have been depending entirely on the creek for their power but are now putting in steam, and the creek will never be lowered so that it will injure public health hereafter.

CAMDEN COUNTY.

HADDON TOWNSHIP. - - *Report from* J. STOKES COLES.

October 31st, 1883. Our local Board held a meeting this evening to hear reports from physicians and others. C. H. Shivers, M.D., gave us a lengthy report, and F. E. Williams, M.D., one not so full of particulars. After reading them over the Secretary was requested to make report for the State Board of Health.

To the State Board of Health, Trenton, N. J.:

GENTLEMEN—After safely disposing of the case of small-pox, last May, this Board has had no case of any kind brought legally before them, and but slight complaint of any kind. Our township has been free from any epidemics, and the death-rate less than usual. Our officers and others are most of them punctual in sending in vital statistics returns.

C. H. Shivers, M.D., reports: Wells are the almost universal source of water-supply in Haddonfield, and our water will compare favorably for purity, softness and good taste with any water in the world.

This assertion, however, must be qualified by excepting the water in that portion of the borough bounded on the north by Park avenue, on the west by Chestnut street, and extending east and south to an indefinite distance beyond the borough limits. The land thus described contains a stratum of marl at a distance of from twenty to forty feet from the surface, which gives to the well-water a disagreeable taste and odor of sulphuretted hydrogen. Most of our wells are dug through a stratum of conglomerate ironstone, and, consequently, contain dissolved in the water, traces of the oxide of iron. The surface-springs in this neighborhood deposit in their streamlets quite a crust of iron oxide. Our well-water is never discolored (marl water

excepted), never tastes badly and seldom fails, even during prolonged droughts. Our wells have never been contaminated with sewage as yet, but I regret to have to say that the time is not far distant when this almost exceptional well-water will become a breeder of disease, unless builders of new houses cease making bottomless sinks and other "latest improvements." I have always recommended, and practice it on my own property, to conduct the waste-water to the garden, thus fertilizing the soil, and, by evaporation and filtration, disposing of this powerful agent of death.

I have always recommended privies to be made without wells, so that the excrement might be cleaned out at least every month. It is not practicable to endeavor to make the use of cemented wells and sinks universal in a town like this. Many cannot afford it.

As above stated, Haddonfield needs no other than the natural drainage, and from its elevated position has very dry cellars. Around its easterly, southeasterly and northerly border there is a chain of creeks and ponds with their accompanying malaria, but away from their vicinity the town is fairly free from it. We also enjoy almost an entire immunity from typhoid fever. There are no sewers.

All our houses have cellars, and probably a half dozen have basements. Many people store potatoes in their cellars. We have no tenement houses.

Many of our cesspools have cemented sides, and some are made by sinking a bottomless hogshead in the ground. There are no cesspools with cemented bottoms, to my knowledge.

This summer and fall we have had five or six cases of typhoid fever in the country near Haddonfield, and one case in the town itself. Three of the cases in the country came under my own care, and all of these had been in the habit of drinking water from the barn-yard pump. All the cases I know of this season have relapsed after an apparent convalescence of from three to five days. Almost all had the "rose-colored rash." Some had sudamina also. Epistaxis was a premonitory symptom with almost all of these cases. But one has died as yet, and his death was caused by a dinner of lamb chops. I mention these cases because the disease is so seldom met with here and because so many had relapses.

GLOUCESTER TOWNSHIP. - *Report from* JOS. E. HURFF, M.D.

The general condition of the township is healthy. Malaria is still quite prevalent, and seems to be much greater in the lower, marshy

districts, especially along a branch of Timber creek, the boundary line of this township, although in general it has not been as severe this year as last. A few cases of scarlet fever and typhoid fever occurred this fall.

STOCKTON TOWNSHIP. - - *Report from* P. W. BEALE, M.D.

As the small-pox is continually making its appearance in the township, we enforce vaccination and quarantine at the earliest possible moment.

Houses heated with stoves, mills by steam. Malaria is and has been the prevalent disease of this township for a number of years, but there is a marked decrease in the number of cases of the typhoid type, and, under proper treatment, most every case recovers. There has been under my own observation a number of cases of diphtheria, scarlet fever and small-pox. The reason I mention diphtheria and scarlet fever is, because the number of cases occurring this year, in comparison with those of three or four years previous, have been very considerably increased, and had not the utmost precaution been taken we would, no doubt, have had an epidemic of these diseases.

DELAWARE TOWNSHIP. - *Report from* F. E. WILLIAMS, *Sec'y.*

Cesspools are the usual termination of the drainage pipes and are seldom cemented, though, as a rule, they are placed at sufficient distance from wells to prevent any likelihood of contaminating the drinking-water.

At the April meeting it was reported that several dogs had been bitten by a rabid dog in the township, and that the owners had not killed them; the Board ordered them killed, which order was complied with by the owners.

There has been no contagious disease reported during the past year, except that during the past winter there have been numerous cases of scarlet fever, diphtheria and whooping-cough in the township.

Malarial fevers during the past summer have not increased, but rather diminished, taking the form of remittent-malarial and typho-malarial fevers.

CAPE MAY COUNTY.

CAPE MAY CITY. - - *Report from* JAMES MECRAY, M.D.

We have needed to do very little with our sewers during the last year; most of the work being done by individuals or by corporations

(private). The Stockton and New Columbia have been remodeled. The Stockton Hotel Company have expended nearly $10,000 in perfecting their drainage, and with complete success; as last season there was not a case of fever in the hotel, or in fact in the city. The Board has been called out twice only during the summer, and then to view pig-sties.

The water-supply is unchanged, and is perfectly satisfactory. Am pleased to state that Cape May Point is being sewered on the same plan as Pullman. We know from experience that it was not begun before it was needed.

LOWER TOWNSHIP. - - *Report from* AARON WOOLSON.

Hog cholera prevailed to some extent. We have had complaint of several hog-pens as a nuisance. The Board notified the owners, and they stopped the nuisance at once.

CUMBERLAND COUNTY.

DEERFIELD TOWNSHIP. - *Report from* C. C. PHILLIPS, M.D.

Ventilation of the houses good and attended to better each year; heated principally by coal stoves and heaters in cellar.

Occasional typhoid fevers and typhoid condition of other diseases. But, take the whole township, it is a healthy one—second to none in the State—very few deaths occurring. People cleanly, industrious and intelligent.

FAIRFIELD TOWNSHIP. - - *Report from* HENRY S. LONG.

During the early part of the year influenza prevailed throughout a greater part of the township with very little complication; very few cases accompanied with pneumonia, and we believe there were no fatal cases. About the same time, or shortly after, measles, as an epidemic, prevailed. No fatal cases are reported. The eruption in many cases was very full and extensive. Although this disease was very extensive in this township, yet we heard or know of no cases that did not recover perfectly.

We had some cases of dysentery during the after part of the season or summer.

Of our nuisances, we have to complain that there exists during the canning season a tomato-canning enterprise which, on certain days,

gives out very unpleasant odors. As the season is now nearly over, and for the present none seem to be annoyed, it is quite probable it will not be interfered with this season. Measures, however, should be taken to have it corrected before another season arrives and the same thing be repeated.

HOPEWELL TOWNSHIP. - - *Report from* C. H. DAN, M.D.

The county almshouse is situated in this township, and is located on high ground and in a healthy situation. It is heated by steam and has fair ventilation, but is in an over-crowded condition. The prevalent diseases of the year have been: in the early spring, measles; and during the late summer and early fall, malaria—which has been much more prevalent than usual this year.

ESSEX COUNTY.

BELLEVILLE TOWNSHIP. - *Report from* R. SKAINE, *Sec'y.*

A complete set of ordinances have been adopted by the Board, intended to enforce upon the citizens such cautionary measures as will best conserve public health.

Registration is observed, and reports of marriages, births and deaths are made in accordance with law.

No general vaccination has been ordered by the Board, but voluntary vaccination is quite general, and due precautions are exercised in all cases of contagious disease.

BLOOMFIELD TOWNSHIP. *Report from* JOSEPH A. DAVIS, M.D.

Investigations in sanitary science are more and more engaging the attention of the people. The proper ventilation of houses, the best methods of preventing the poisonous gases of cesspools from entering dwellings, the relation of cesspools and water-closets to wells, the effect of decaying substances thrown upon the surface of the soil, pools of stagnant water undergoing decomposition, polluted streams and ponds acting as fermenting vats and sending off their mephitic gases, and other sources of disease, are looked after with far more earnestness than formerly, and efforts are made as far as possible for their removal.

In our town, outdoor matters have for the most part engaged the attention of the committee. Pools of stagnant water and locations of wet soil have been sought out and received proper drainage. Cesspools

and water-closets have been looked after, and have been, with the coöperation of the people, to a considerable extent improved.

Contracts have been made by the township committee with the East Orange Water Company, to supply water in nine miles of pipe, for ten years, at an annual expense of $6,000. The work is partially completed.

Three thousand dollars have been expended upon the public grounds during the year, and strict attention has been paid to surface-drainage. No prevalent disease has occurred during the year, and it is evident that by following up the sanitary methods now in use great good will be accomplished.

CLINTON TOWNSHIP. - *Report from* M. O. CHRISTIAN, M.D.

The general health in the township has been excellent since April. Malarial fevers of all varieties, which prevailed extensively the three preceding seasons, were almost entirely absent this year.

The same can be said of diphtheria. While it was quite prevalent prior to '83, during this year it has been rarely met with in our township.

In the fall of '82, and continuing well along through the winter, cases of scarlatina were very numerous. During the latter part of the winter pertussis became the favorite and was introduced pretty thoroughly through the schools. This gave place in the early spring to an epidemic of measles, which continued along into April, since which time our vicinity has been quite free from infectious diseases, even cholera infantum having been rare, owing, probably, to the moderate weather of the past summer.

The only means taken to prevent the spread of infectious diseases here is the exclusion from the public school of children who are known to reside in houses where such diseases exist.

A nuisance which had been abated in '82 by order of the court, was continued again for a time this season. It was the garbage from the Newark market: fish heads, entrails, cabbage leaves and other debris usual about markets, received and deposited in an open cellar of large dimensions by a farmer within the village limits.

EAST ORANGE TOWNSHIP. - - *Report from* P. WOODRUFF.

The water company is private. Exact number of subscribers is not known to the Board. Water is never discolored. Tasteless. Neither hard nor soft. The water is uniformly good and the pipes

are cleansed. No reservoirs. No sewage is received. We have no data as to the number of wells or cisterns.

There are no sewers. Cesspools are largely built with open bottom and sides; are generally emptied by odorless excavating companies.

ORANGE. - - *Report from* THOS. W. HARVEY, M.D., *Sec'y.*

The water-supply, which was only projected at our last report, has become an actual fact. The city of Orange is now supplied with a plentiful supply of soft water, from the west branch of the Rahway. The water is brought by gravity, and has an ordinary pressure of eighty pounds, and furnishes an efficient fire service without the use of fire engines.

The summer has been remarkable for the absence of diarrhœal diseases in children. Dysentery, which was epidemic in 1882, has been very rare this year, and our death-rate for the year will be much lower than in 1882.

MONTCLAIR TOWNSHIP. - *Report from* JAS. OWEN, C.E.

There is a hook and ladder company, with forty-five members, with a truck supplied with extinguishers.

Two cemeteries are in the town, Rosedale and Mount Hebron.

The Board of Health organized this year and established a code of ordinances, which is very complete, for the sanitary improvement of the town. The efforts of the Board have mainly been concentrated in preventing the pollution of the streams by direct or indirect connection with cesspools; the proper cleaning of overflowing cesspools, care being taken in having the contents completely removed away; the prevention of garbage dumping, and the proper drainage of surcharged districts. As far as their efforts have extended they have been met with a hearty coöperation of all citizens, even those who were offending. The fact of having attention called to any trouble seemed, in almost every case, the only effort necessary for its removal, showing a strong and hearty interest by all citizens in sanitary matters. Where coöperation would have been necessary, the Board, in such cases, undertook the work themselves, and two or three bad localities have been radically improved. The great trouble, as in all suburban towns, is in getting rid of the sewage, and though all are anxious to do the right thing, yet the difficulties in the way are very great, on account of the want of proper knowledge by experts themselves in the matter.

The Board have as yet had no occasion to resort to any quarantine regulations. The physicians in town are all in hearty coöperation with the Board, and have reported any serious case to them, and investigations have been made into the cause.

SOUTH ORANGE TOWNSHIP. *Report from* A. A. RANSOM, M.D., *Sec'y.*

We have had one year trial from draining the mill-pond, as we let the water off last October, dug a channel through five feet on the bottom, thirteen feet top, some five or six feet deep; as we had this all done in the winter, we now have reclaimed about fifty acres of good land. Have had no malarial fever, or as little if not less than any year for the last eighteen years, the time I have lived here; and all these for the cost of $1,300. All are pleased with the result.

WEST ORANGE TOWNSHIP. - *Report from* EDMUND CONDIT.

The system of drainage is a natural one, and, owing to the rolling character of our territory, is probably as nearly perfect as human skill could make it. The cellars are mostly dry, and malaria is seldom found unless contracted elsewhere.

In most cases the houses have cellars, comparatively few have basements. The cellars are quite largely used for storing vegetables, &c. There are not many tenement houses of more than two families.

GLOUCESTER COUNTY.

GLASSBORO TOWNSHIP. - *Report from* JACOB ISZARD, M.D.

The drainage is not so very good on accouut of the flatness of the ground. The sewerage is very imperfect. The majority of the inhabitants are employes in the glass factories, who do not pay proper attention to their water-closets or drains from the pumps or wells.

Small-pox was quarantined last year, and all the children vaccinated in the township.

GREENWICH TOWNSHIP. - - *Report from* JOHN STETSER.

Two hundred dollars was appropriated at the annual town meeting to drain the streets of Paulsboro. Under the supervision of one of the township committee, the money has been used for that purpose, making a marked improvement in the surface-drainage of the township.

Slaughter-house has been kept in a healthy condition through the year, but one complaint having been entered, by only one person, of a nuisance during the year. The refuse not being allowed to accumulate so as to become a nuisance, and detrimental to health.

Cow-pens, hog-pens and privies have been kept in a good sanitary condition during the year, by the removal of their contents when necessary, under legal notice and inspection, so as not to be a nuisance to neighbors.

HARRISON TOWNSHIP. - *Report from* E. E. DE GROFFT, *Sec'y.*

Cases of malarial fevers, although having prevailed to a considerable extent during the spring and summer months, have not been so numerous as last year.

What few cases of typhoid have come under our notice have been traceable to stagnated pools of water and incomplete drainage.

Our people are pretty well protected against small-pox, there being very few children in our schools but what have been vaccinated.

WEST DEPTFORD TOWNSHIP. - *Report from* EDWARD J. LODGE.

At one of the meetings of the Board, it was resolved to use the authority of the Board to see after the vaccination of the children (if needy) at the expense of the township.

WOOLWICH TOWNSHIP. - *Report from* W. H. MCCULLOUGH.

The township Board of Health is in its infancy, this being the first year of our organization. There has been only one complaint against nuisances, and that was promptly attended to and abated.

HUNTERDON COUNTY.

DELAWARE TOWNSHIP. - *Report from* ASA H. HOLCOMBE.

We consider our township more healthy and less subject to malarial fevers than formerly. The prevailing disease of the various forms of malarial are mostly confined along the borders of the Delaware river, and the disease seems to be in a milder form than formerly.

FRENCHTOWN. - *Report from* GEORGE C. LANDON, *Secretary.*

In regard to sewerage, there seems to be no general system. Most families have a short covered drain leading from the kitchen into the

back yard or garden, and terminating in a cesspool, into which all slops are conveyed. Others do not take even this precaution, but throw the waste-water upon the ground in the rear of their houses.

The cellars and basements of most houses are in good condition. The walls of the cellars near the river are frequently very damp during the spring of the year, caused by the water coming into the cellars and remaining for some time. Latterly, however, the cellars have been better drained, and one cause of disease has been greatly lessened. As a general thing, the houses of this borough are in a first-class condition as to cleanness.

KINGWOOD TOWNSHIP. - - - *Report from* H. P. SHAW.

The general health of the township has been good—very few cases of sickness since the prevalence of dysentery last fall. Of the twenty deaths reported since October 1st, 1882, eleven were people of seventy years and upward. A few cases of malaria have been reported, but of a very light form.

LEBANON TOWNSHIP. - *Report from* A. S. PITTENGER, M.D.

Our water-supply is from springs and wells, except in a few instances among farmers, although our largest village in the township—Junction—is wholly dependent on cisterns, and it is in this village that most all our fevers, especially typhoid, exist.

Our Health Board is active, obey all summons, and in all cases strives to do its duty.

RARITAN TOWNSHIP. - *Report from* JOHN H. EWING, M.D.

From January, 1883, to April, 1883, diphtheria epidemic in the town of Flemington. During the summer months very few diseases incident to the season. At present time unusually healthy.

The local Board of Health, during the summer, has taken steps which will result in one of our largest open drains in Flemington being properly piped and closed. No flushing, except surface-water.

TEWKESBURY TOWNSHIP. *Report from* O. A FARLEY, *Secretary.*

Scarlet fever, malaria and phthisis have been the prevailing diseases. Scarlet fever prevailed as an epidemic, there being about one hundred and fifty cases and many deaths.

WEST AMWELL TOWNSHIP. *Report from* S. R. VAN BUSKIRK, *Sec'y.*

Well organized Board of Health; meets regular; looks after all matters.

MERCER COUNTY.

CHAMBERSBURG. - - - *Report from* WARD M. SMITH.

Cellars are generally dry. We have no sewers. Part of the gutters are paved, and part are not paved. Have heard of some few cases of malaria, which some attribute to the foul gutters in the borough. We have a very filthy pond in the borough, called Crow lake, which contains stagnant water and is very dangerous to health.

HAMILTON TOWNSHIP. - *Report from* GEORGE A. HUTCHINSON.

There were several complaints made to the Board of Health of Hamilton township during the year, which were all attended to by the Board. First was the dumping of night-soil on State street road, which was ordered to be removed and stopped dumping there, which was done; and, also, on Chambers' farm the same complaint, the dumping of night-soil, which the Board has also attended to, and the odorous smell stopped by covering it up. There was a complaint made from Hamilton Square concerning the state in which slaughter-houses were kept in that place, which was examined by the Secretary of the Board, and the same ordered to be kept clean, and all offal, from dressing animals, taken from the place, which was done and disinfectants used to keep the place in good order.

HIGHTSTOWN. - *Report from* J. P. JOHNSON, M.D., *Secretary.*

The mill-pond, which receives the sewage from Peddie Institute, (the Baptist school, numbering over 100 pupils,) is considered by the Board to be in a bad condition, and there is a disposition to have the matter remedied.

Two slaughter-houses are quite near dwellings, and some complaint is made of one of them.

A canning factory, which has been in operation for over a year, has been a source of much complaint. The large amount of refuse which finds its way into the brook running through the most thickly-settled portion of the town, becomes very offensive by lodging along its banks.

Malarial troubles have existed to about the same extent as during the year previous.

MILLHAM TOWNSHIP. - - - *Report from* J. J. CLANCY.

No system of drainage or sewerage. There are portions of the township where there is considerable standing-water after a heavy rainfall, and in the vicinity of this standing-water wet cellars abound. There are swamps and malaria is frequent.

Houses, generally, have cellars, and are not tenanted. Many use the cellars to store away vegetables.

No system for removing refuse and excreta. Privies are usually cleansed yearly by scavengers.

PRINCETON. - - - - *Report from* J. S. SCHENCK.

The most important event of the year is the introduction of public water of fine quality and abundance. Will soon come into general use.

TRENTON. - - - *Report from* WILLIAM CLOKE, *Sec'y.*

The Trenton Board of Health has been very successful during the past year in accomplishing the objects of its existence. It has very materially improved the sanitary condition of the city. The reform upon which it plumes itself the most is the radical abatement of what was known as the "Water-Power Nuisance." This water-power, or race-way, of the Trenton Water-Power Company, winds for about a mile through the thickly-settled parts of the city. The people living along it are mostly mill operatives and factory hands. Nearly all whose back-yards abutted on the race-way built their privies over the stream. They also sewered into it from their kitchens. Several hundred privies lined the edge of the race-way, and innumerable gutters and spouts and sewers poured their nauseous burdens into the filth-glutted stream. The race-way was sluggish with foulness, and reeked with odors inconceivably vile. The Board addressed itself to the abatement of this nuisance immediately upon its organization, a little over a year ago, and its efforts have been crowned with complete success. Every privy has been removed, every sewer and sluice-way cut off, the banks of the stream have been nicely graded, and it is now as clean and sweet and wholesome as the Delaware river itself. The improvement has been very grateful to the people living along its banks. Instead of being stifled and made ill by its fœtid odors, they were able last summer to spend their evenings sitting upon its pleasant banks. To the New Jersey Steel and Iron Company the credit is largely due for promptly complying with the orders of the Board and making these improvements.

The Board also has in hand, with a fair prospect of success, the Petty's Run nuisance. They have begun proceedings in the Court of Chancery to compel people to cease polluting this stream with their sewage.

During the year, since my last report, over six hundred nuisances, of various magnitude, have been abated by the order of the Board and through the vigilance and activity of Inspector McGuire. The sanitary condition of the city is good and steadily improving. Our public markets are in excellent condition, the public alleys are kept pretty well cleared of garbage accumulations, and people are generally careful about the sanitary condition of their premises.

WASHINGTON TOWNSHIP. - - *Report from* JOHN B. YARD.

The Township Committee were called together on the 14th day of July last by order of the Board of Health of Upper Freehold township, to attend to the cleaning out the channel of the Carson mill-pond, in this township. The refuse in said channel had stopped the free passage of the water down through the meadows, and caused the water to back up and become stagnant in and about Sharon, a small village on the county line between Mercer and Monmouth, in Upper Freehold township. In consequence of the stagnant water there were a great many cases of diphtheria—some fourteen, I believe, were reported at once, and some were fatal. Our Board met on the said day and viewed the premises and decided to have it cleaned out in our township, and served notices on the land-owners on both sides of the stream, and it was done very promptly and effectually, but with several hundred dollars' cost. After we had ours cleaned out, then those on the upper end of the stream, in Upper Freehold township, cleaned theirs out, and I hear no more from it now. The water was so poisoned the fish died and floated on top of the water. Our physician said that he thought that the cause of the sickness was owing to the foul and dead water.

Our township is very clear of anything that is considered injurious to the health of the inhabitants. We have no factories of any kind to make any bad odor or anything of the kind. We get our drinking-water from wells, and it is mostly very good and pure, consequently the people are very healthy, perhaps as much so as any township in the State.

MIDDLESEX COUNTY.

NEW BRUNSWICK. *Report from* THOMAS L. JANEWAY, *Secretary.*

Only about one-third of the city is sewered, and this sewage empties into a slack-water, causing the return of noxious and mephitic gases upon the town. It is scarcely necessary to point out its insalubrity. Water is supplied to the city by means of hydrants and wells and pumps. Previous reports have clearly demonstrated that some of our wells have unquestionably caused sickness. The Common Council have been memorialized upon the subject and have failed to abate the causes of disease.

The cellars in the lower part of the town are almost uniformly damp, perfect drainage being impracticable, owing to the fact that the water-level of the Delaware and Raritan canal, running in front of the city, is above that of the bottom of the cellars. The only efficient relief for the existing state of affairs would be found in the construction of a sewer running the length of the town, or in the removal of the slack-water formed by the canal above referred to. Therefore, we may unhesitatingly say that the drainage of a large portion of the city is decidedly bad. Cesspools exist in many parts of the city, and as they are not closely built must allow saturation of the soil.

[I have personally examined the drainage and sewerage of New Brunswick, and must fully confirm these views.—E. M. H.]

The city of New Brunswick has suffered in a moderate degree from scarlet fever, diphtheria, measles and intermittent fever, the latter having been confined to restricted localities.

This Board would call attention to an effort recently made to interfere with the practice of vaccination in our public schools. In our judgment this can only result in evil, as being contrary to the experience of the world during the last century.

PERTH AMBOY. - - *Report from* E. B. P. KELLY, M.D.

Water-supply is public, furnished by a private corporation, known as the Perth Amboy Water Company, from a stream at the westerly boundary of the city, known as the "Five Oaks." The water is soft, and slightly discolored, which will probably be remedied by a filter in the reservoir, now in course of construction. Comparatively a small portion of the inhabitants use it, preferring wells and cisterns, as being more economical.

Sewers are constructed upon the most approved plans, properly ventilated, and arrangements are made for flushing, as often as necessary.

Due care is taken in regard to contagious diseases, and the law relating to vaccination of children is rigidly enforced.

PISCATAWAY TOWNSHIP. *Report from* Dr. A. S. TITSWORTH, *Sec'y.*

An epidemic of measles swept over our township, and in some instances nearly broke up the schools; and although some cases were marked with great severity, there were but few fatal cases, and nearly all of these were the results of complications.

There have been a few cases of scarlet fever, but this disease has not been very prevalent.

There has been an unusual tendency to diseases depending upon so-called malarial influences. Intermittent and remittent fevers have been unusually prevalent, but have generally yielded to proper treatment.

WOODBRIDGE TOWNSHIP. *Report from* S. P. HARNED, M.D., *Sec'y.*

Drainage by natural water-courses, brooks, creeks, &c. Most cellars require drains, which secure dry cellars. Have had less malaria than for many years past.

Some varicella. Acute dysentery has prevailed, more than in any year within the last twenty years.

MONMOUTH COUNTY.

ASBURY PARK. - - - - *Report from* H. MITCHELL.

Since September 1st we have had nine cases of typhoid fever. The type has been mild, only one death resulting. We believe that the appearance of this disease is unquestionably due to the pollution of certain wells by casting waste-fluids upon the ground.

The sewers have satisfactorily performed their duty, and seem to be without objection at present, except concerning their ventilation. The street openings have in some instances been offensive. The outflow has been free from objection during the past year. No odors have existed at the outfall.

KEYPORT. - - - - - *Report from* S. V. ARROWSMITH.

We have no systematic system of drainage nor sewerage. A blue clay subsoil, which underlies the greater part of the town, causes considerable dampness in basements and cellars.

Malaria has prevailed to about the usual extent, generally in a mild form.

LONG BRANCH. - *Report from* E. B. BLAISDELL, *Secretary.*

Drainage and sewerage very incomplete. Hotels and large buildings have large sewers and cesspools on the premises. Dwellings generally have no particular system, and water-closets in the general country style. The city Board of Health, but recently organized, hope to remedy the evil as fast as possible.

The Board of Health has been but recently organized, and have adopted a set of resolutions, and hope to improve the condition of the city as fast as possible.

MATAWAN TOWNSHIP. *Report from* BENJAMIN GRIGGS, *Secretary.*

The Board has had a diligent oversight of the sanitary condition of our township.

No report of nuisances has come to our knowledge. There has been no epidemic or prevailing disease of any kind, and our locality during the year past has been, with very little exception, unusually healthy.

OCEAN GROVE. - *Report from* Rev. A. E. BALLARD, *Sec'y.*

The surface soil is composed of sand, reaching down to various depths of from two to forty feet. Underlying this is a strata of variously colored clay, which is underlaid again by gravel. Below this, so far as we have been able to test it, for a depth of from 100 to 120 feet, is a mass of black clay, after which is a thin layer of sand and shell, followed again by the thick black clay to a depth nearly 300 feet; after which comes again sand and gravel for fifteen to twenty feet, and filled with excellent water, which comes to the surface in an artesian well, with a product of fifty gallons per minute. This experiment has been made at great expense, and settles the fact that at a depth of 422 feet, water, tested under the direction of the State Geologist, and certified by him to be of the purest quality, soft and healthful, almost entirely free from mineral matter, can be obtained

in almost unlimited quantities, and beyond the reach of possible contamination.

It is under consideration to increase the number of these wells, as circumstances may call for them, until there shall be a full supply for all the cottages and hotels of the Grove.

The general water-supply is at present mostly obtained from "driven wells" at a depth varying from eighteen to forty-eight feet. Except in the vicinity of a small area near the sea-shore of Fletcher Lake, where there is a marshy taste, it appears, from the scientific tests which have been applied, to be good. The difficulty near Fletcher Lake has been remedied by setting the wells a few feet further away. In some cases the water has been found so impregnated with iron from the corroding of the pipes as to lessen its pleasantness for culinary and drinking purposes, as also for washing. This is being obviated by the introduction of pipes properly galvanized, and inserted in tile wells with either porcelain-lined or wooden pumps.

There have been three cases in which it has been supposed that water deterioration might have come from contiguous cesspools, but investigation failed to show its certainty, and the causes remained unknown. The wells were changed and the difficulty disappeared, except in one case where the cesspool has been removed and the well remains for the purpose of testing. There have been no cases of sickness attributed to water.

The proposition is now to make the supply from artesian wells, which shall be carried through pipes into all the houses of the Grove, and replace in this way the wells now so near to the surface.

The whole place is being sewered as rapidly as possible. Already 23,550 feet, making four and a half miles, are laid, and arrangements are being made to complete the system as rapidly as possible. The system brings all sewage matter into one main pipe, which discharges into the sea at an average height above high-water of four inches, at the foot of Embury avenue. It is taken out for a distance of 500 feet into the sea, in a flume made of Georgia pine, which flume is bolted to piling driven down to the ocean floor under it, and by its side above it. The natural descent is so great that the flow is continuous, and but little offensive odor when opened, and no perceptible odor where it empties into the sea, while the discoloration of the water, wherever there is any, does not extend over three to five feet. There has been no offensiveness from it in connection with the bathing, and no odors along the vicinity since the old ventilators have been closed and the

old cessvaults taken away. The works have been erected at a very heavy cost, but it is believed by us that they have solved the question of an outlet for the sewage which shall be in accord both with the laws of taste and health. Our maps are so constructed that all under-ground work, all pipes and the contour of surface, is easily understood and determined. These sewers comprehend the more populated parts of the Grove, and are being extended with the extension of the population.

A number of plans are being considered by which the entrance of sewage above the lake can be prevented, and also by which the lake can be more effectually cleansed, but none have as yet been adopted.

Many of the water-closets are connected with the sewers, and it is the policy of the Association to have them all connected at as early a day as may be found possible.

A plan has been devised, and partly carried out during the past year, to inspect the sanitary condition of every house in the Grove. It is intended to complete the plan during the coming season. The hotels, with a very few exceptions, have all been inspected from garret to cellar, with all the surroundings, by the Secretary personally, and reports kept in a book of minutes. All private houses, where there has been any suspicion or complaint, have been officially inspected by the same officer, and where any offensive or unhealthy condition has been found to exist, the evil has been remedied at once, and, in the owner's absence, charged to the property. In almost every case the property owners have been found to be anxious to coöperate with the Board of Health.

Garbage is collected every day during the warm season, and two to three times during the week in the winter, from tight barrels, and carried away in tight wagons to a distance of four miles and buried, at a contract cost of $1,200. The grounds are carefully raked every day and the refuse carted away.

OCEAN TOWNSHIP. - *Report from* GEO. W. BROWN, M.D.

There is nothing of special interest to report this year, as a "city Board of Health" has been organized since our last report, and most of the sanitary work has been within the city limits.

We are still well organized, however, and have at times found work to do. Since our last report we have adopted a sanitary code similar to the one governing the city of Trenton.

SHREWSBURY TOWNSHIP. *Report from* JOHN S. THROCKMORTON.

One sewer, extending from Mechanic street, Red Bank, to the river, twelve-inch pipe. Cesspools built now are all cemented; the old ones are emptied with steam force-pump into tight barrels and carted away:

No prevalent disease. Some malaria in a few localities.

The Board of Red Bank inspect the slaughter-houses, and have had them kept in order to the best of their abtlity. Still some complaints arise, which are immediately attended to.

UPPER FREEHOLD TOWNSHIP. *Report from* H. G. NORTON, M.D.

We would report Cat-tail brook as opened, and an extensive meadow drained, under the direction of Mr. Geo. Vanderbeck, Assessor. After draining the lowlands around Sharon, which were much of the time overflowed by this brook, much of the sickness in the vicinity disappeared as by magic, especially diphtheria and malaria, which had been rife during the early spring and preceding winter.

There are, in our township, several cesspools with open bottoms, bricked sides, which are irregularly cleaned, generally not until they become full of offensive matter.

Three years ago malaria became very prevalent across our southern line in Ocean county, in a section of pine country always, until then, free from anything like malaria; not until the present fall and summer has it seemed to spread from its origin—in and about Prospertown—while, at this writing, chills is the almost universal complaint in the southern portion of the township.

This summer, disease has shown itself among the hogs; wherever it has appeared the farmers have lost all, or nearly all, of their hogs and pigs. Six farmers have been heavy losers, having lost their entire lot of hogs. As our township produces probably the heaviest pork yield of any in the State, the disease, as it has appeared among us, causes much apprehension, and deserves careful study.

This fall has been characterized by a more than usual amount of typhoid fever, but it seems extremely hard to convince people that there is any connection between poor drainage, cesspools and shallow wells and the fever.

There was an extensive epidemic of measles last spring, but not one case terminated fatally.

MORRIS COUNTY.

MORRISTOWN. - - - - - *Report from* C. F. AXTELL.

The water-supply of Morristown is excellent, pure spring-water, furnished by the Morris Aqueduct Company. The supply is not only pure and good, but believed to be adequate.

The natural drainage of Morristown is fairly good, but we need now a system of sewerage. The cesspool business ought to go forever.

Refuse is deposited on a public dumping ground in trenches, and these covered with fresh earth.

There are no slaughter houses or abattoirs in the city limits.

There is no regular quarantine or care over contagious diseases, except as necessity demands. If aggravated cases appear, they are isolated as far as possible from outside communication, under the direction of the Board of Health and City Physician.

MT. OLIVE TOWNSHIP. - - - *Report from* JOHN D. BUDD.

The health of the township has been fair, and, we think, an improvement on former years. Those who were affected, by cleaning their wells properly have improved the conditions of their families and surroundings.

We are decidedly against any further centralizing of power in law to county physicians; as aside from the inconveniences and costs of calling on him as to the cause of sudden death, it is unjust to local physicians and acting coroners, who, as a general thing, are far better posted in their duties as to the cause of death than any doctor appointed by any Board of Freeholders or otherwise, and we shall strenuously use our influence politically, as representatives of both the great political parties, against county centralization of the powers of the Board of Health. We are willing to receive the authority of the State Board, but claim our own township rights.

ROCKAWAY TOWNSHIP. - - *Report from* ELIAS B. MOTT.

Very few changes, affecting the sanitary condition of our township, have occurred since our last report, October, 1880.

Much might be said in regard to our supply of water for drinking and cooking purposes. It is very much to be regretted that no adequate provision has been made for obtaining an analysis of the water

in some parts of our township, obtained from wells, and which I believe to be unhealthful. This would necessitate a knowledge of the structure of the soil, with its effect on the purity or impurity of the water. A thorough knowledge of this subject in all its relations to health would, I believe, cause the abandonment of some of the present sources of supply, and cause other means to be adopted for its obtainment. Although a hilly country, with many fine natural springs and consequent streams of clear water, the greater number of our population depend almost entirely on wells and cisterns for supply. In some parts of the township the wells contain an undiminished supply of pure water throughout the year, regardless of climatic changes. In other parts both the quantity and quality change with the change of seasons, and in some instances are unfit for use during the latter part of the summer months. This is true as regards some parts of the village of Rockaway, and also some of the mining villages. As regards the mining villages, the proximity of mines, many of which are far deeper than the wells, may explain one of the causes; in the other case, perhaps, the geological structure of the earth, or not being sunk to a proper depth, may explain the cause. Quicksand underlies a portion of the surface in our village (Rockaway), rendering it a very difficult feat to obtain water by means of wells. A resort to cisterns is the result. These are constructed in the usual manner, and many of them contain filters, usually a cemented brick partition through which the water must filter. Many are provided with turn-offs, to prevent the first rain-fall from carrying impurities, deposited on the roof, into the cisterns.

But many others are not in good condition, some are built under the houses and the air completely excluded, seldom cleaned, and no means to prevent roof-washings from being deposited into the cisterns. A few have iron pipes. Lead is in general use.

The natural drainage is good, but in some instances artificial drainage is absolutely necessary to prevent disease. This is the case at Mount Hope. On each side of the ridge, containing the ore, is a swamp. The people residing in the vicinity of this swampy land had been afflicted with malaria in its many forms for several years. The present superintendent, Mr. Matson Williams, has caused these swamps to be drained, and malaria is now no more prevalent than elsewhere. Other instances of the beneficial effects of artificial drainage could be mentioned, but still more instances where benefit would accrue from having it done.

There is probably not a brook or stream in the township used to carry off sewage. Cesspools and out-of-doors water-closets are not usually planned and arranged with a due regard for healthfulness. There is not, probably, a cemented cesspool in the township. A trap, inserted somewhere between the kitchen sink and the cesspool, is usually considered a perfect safeguard against any noxious gases or odors arising from this depository of nastiness.

The refuse and excreta from stables, in the villages, are readily disposed of to neighboring farmers, but not so with contents of privy vaults, which remain (in some instances) uncleaned for years. In many instances the closet is removed to a new vault, and the old one covered with earth, as the easiest method of disposing of the matter.

OCEAN COUNTY.

EAGLESWOOD TOWNSHIP. - *Report from* WM. P. HAYWOOD.

Nothing favorable. School houses in a tumble-down condition, and too small and badly warmed and ventilated for cow-houses; too small for the children in attendance. Trustees mostly have no children, and do not urge that their neighbors' children get an education.

LACEY TOWNSHIP. - *Report from* MARCUS KENYON, M.D.

No contagious diseases, but five cases of typhoid fever; the customary precautions taken to prevent spreading. Vaccination not well kept up.

PASSAIC COUNTY.

PASSAIC CITY. - - - *Report from* F. H. RICE, M.D.

The open-bottom cesspools are in use, and usually emptied by pump. We have had less malaria this year than ever before.

PATERSON. - - - - - - - See page 172.

POMPTON TOWNSHIP. - - *Report from* CLARK W. MILLS.

Drainage and sewerage is of the most primitive kind. There are many small swamps whose outlets are natural, which cause more or less malaria in their immediate vicinity.

WAYNE TOWNSHIP. - - *Report from* RICHARD J. BANTA.

There are many defects in the natural drainage, especially in the western part of the township. But parties owning those lands have seen the necessity of having the land drained, and I have no doubt that, before the next report, it will be properly drained.

It has been very healthy the first part of the season, but at present there are quite a number of cases of malarial fever.

WEST MILFORD TOWNSHIP. - *Report from* THEO. D. COURSEN.

Malaria still prevails throughout the township, but there is a marked absence of the more severe forms.

SALEM COUNTY.

MANNINGTON TOWNSHIP. *Report from* D. F. GRIER, *Secretary.*

We have had some trouble with contagious disease on a farm of Isaac Smith, about one mile from the Hogan farm. In the month of June last he lost six head of cattle and three colts. The disease was anthrax fever. The feeding-grounds were low and springy, about the same as Hogan's were. * * * We had the stock put on different feeding-grounds. First, all died in about three weeks. It was a milk dairy, and the cattle were fit for the butcher. I think one of the best herds in the township. The stock appears to be all well now; none have died since June last.

QUINTON TOWNSHIP. - - - - *Report from* G. A. AYARS.

Three school houses in township. Should be more by all means. They are wanted, and very much needed.

SALEM. - - - *Report from* JOSIAH WISTAR, *Secretary.*

The surface of this, as well as of the surrounding country, is flat, with an elevation above tide-water barely sufficient for good drainage. In former years, when the meadows and low grounds which border our numerous tide-water streams were but partially drained, the town and adjacent country had a reputation for unhealthiness—chills and fevers generally prevailing during the autumn of each year; but for the past thirty years the low lands above alluded to have been more thoroughly drained, and, as a consequence, this vicinity has been as free from malaria as any other locality.

Until within two years past we had no water-supply except that obtained from wells and cisterns; the well-water being hard. The city is now supplied with water from Laurel Run, which is dammed for that purpose, and the water forced through iron pipes a distance of three and one-half or four miles by a steam engine, on what is known as the Holly system. The works were built and are owned by the city. The water thus supplied has not as yet been much used for drinking, except to some extent last winter, its quality during the warm months not having been entirely satisfactory. This Board has had the matter under its care, and made certain suggestions to the city council for its improvement, some of which have been carried out with good effect, and it is hoped time will remedy some of the evils heretofore complained of, particularly as there is no cause of foulness in the stream itself, it being fed by numerous springs. It has been introduced into nearly two hundred buildings or premises, and it is believed its quality will be improved the more it is used.

The streets of our city have been graded, and are well drained by paved gutters, but no public sewers have as yet been built. Some houses in the lower portions may have water in their cellars during the spring or when the springs are unusually high, but generally the cellars are entirely dry, much more so than before the present system of drainage was perfected.

The city not being compactly built, and the lots being of considerable depth, outhouses or privies need not, in most cases, be placed near enough to dwellings to occasion inconvenience or endanger health. But this Board feels that it is a subject that must claim its attention, and has already, in one or two instances.

The slaughter-houses are located to the south of the city, but within its limits, and, when built, were a sufficient distance from any dwelling not to cause annoyance. But as new houses have been built, and the city extended in that direction, complaints have been made of the unpleasant smell occasioned by decaying blood and refuse. A committee of this Board now has the subject under care, and confidently hope to remedy the evil.

We have not been called upon to deal with any contagious or epidemic disease since our organization, except some cases of small-pox, which occurred during the spring and early summer, three of which proved fatal. The Board quarantined the inmates of the houses where the disease existed, and used such other means as were deemed best to prevent its spread, and made certain suggestions to the Board

of Education in regard to the vaccination of the children attending the public schools, which they have adopted. Our population comprises quite a number of colored families, and it is from these we have most to fear in regard to this disease. The Board of Chosen Freeholders have been considering the expediency of building a pest-house for the accommodation of persons afflicted with contagious diseases, and which we hope will be completed in the near future. The expenses incurred in the care of the cases alluded to were borne by the city.

Though the Board has been in existence but a little more than a year, and has not the benefit of long experience, yet we are impressed with the importance of preserving the public health, so far as it depends upon our efforts, and have desired to act in such a way as not to diminish, but to strengthen, our influence for good in the community. Having this object in view, we have endeavored not to interfere where action was not necessary, though at the same time not hesitating where the circumstances seemed to require it.

SOMERSET COUNTY.

BEDMINSTER TOWNSHIP. *Report from* WM. P. SUTPHEN, *Secretary.*

Malaria has existed. The Board officially notified the inhabitants of the southern portion of the town of Peapack to abate causes. The demands of the Board were complied with. The trouble then was malaria, and since that time, which was the middle of June, the town has been healthy.

There was no natural cause or earthly reason for malaria at that time, except one, a habit of letting unhealthy, filthy and poisonous matter lay around loose. The orders of the Board were obeyed; but it appears strange that people, who assume to be sensible, should have to be told to do things for the promotion of their own health, which common decency would demand, without the item of health being considered.

BRIDGEWATER TOWNSHIP. *Report from* WM. S. POTTER, *Secretary.*

Water-supply of Somerville and Raritan is by water-works of Somerville & Raritan Water Company, pumped in stand-pipe at Raritan from the Raritan river. Water is sometimes discolored from

rains, although the company has four large filters of the most approved and latest arrangement, filtering through white shore-sand, which does the work very well, it is said, in all ordinary kinds of muddy water; but our peculiar kind of red shale soil so discolors the water that it baffles the process for filtering for several days after a freshet. The water is soft. The filters are arranged by some back action for cleansing. There is no sewage in the stream or river above the point from where it is taken out of the river.

About half, or more, depend upon wells. A small proportion use cistern-water, arranged with filters.

Slaughter-houses are inspected by the Board of Health in summer time, and ordered kept as clean as possible. Also, all outhouses are ordered cleaned, and kept so, as far as possible.

No evil to health arising from any manufactories.

The Board issue circulars, and distribute them in Somerville, Raritan and Bound Brook, suggesting disinfectants and plans for preventing disease and sickness.

HILLSBOROUGH TOWNSHIP. *Report from* W. H. MERRELL, M.D.

Malaria has been less frequent than for two or three years.

During the winter and March, typhoid-pneumonia prevailed endemically. The type was severe, and several cases proved fatal. The Assessor inquires faithfully as to losses of animals and contagious diseases.

When the last report was sent, the Board were engaged with a nuisance at Van Aiken Station. When Mr. McPherson was informed in the matter, he expressed his determination to do everything in his power to abate the nuisance; and he did; and the Board needed only to advise in the matter.

MONTGOMERY TOWNSHIP. - *Report from* WM. OPPIE, *Secretary.*

In making my assessment this summer I have had a good opportunity to look over this township, and I found it in as good condition for cleanliness as could be expected. We have had no prevailing disease with us this season, and the general health of this township has been good.

What few cases of malaria we have had have been very light, and those mostly persons that came from other localities.

SUSSEX COUNTY.

STILLWATER TOWNSHIP. - *Report from* C. V. MOORE, M.D.

As to the health of the township, there has been less disease and sickness than usual, nearly the same amount of intermittent fever, less typho-malarial cases; a few cases of dysentery in the village of Stillwater, all yielding to treatment.

We have seven other reports from townships of Sussex county, which show that the assessors are attentive to their duties, but that town committees often fail to consult as to the health of the townships. Yet facts are before us which show that malaria factories exist in some localities in the county; that many children have been lost by contagious diseases which proper isolation and instruction would have prevented, and that a local outbreak of typhoid fever occurred, "which was very plainly attributable to polluted drinking-water."

—*Secretary.*

UNION COUNTY.

CLARK TOWNSHIP. - *Report from* WILLIAM J. THOMPSON.

The local Board of Health supervise matters relating to public health, and have acted promptly in all cases brought to their notice.

CRANFORD TOWNSHIP. - *Report from* JOHN W. CLOSE, *Secretary.*

The prevalent disease of the past year was dysentery, which at one time assumed a malignant form; but by prompt action of the Health Board in abating nuisances and using disinfectants, and the untiring efforts of Dr. MacConnell, we escaped a very severe visitation of the disease. It was principally confined to children.

FANWOOD TOWNSHIP. - *Report from* F. W. WESTCOTT, *Secretary.*

I know of only one instance of disease, where a farmer lost five horses; pronounced by the veterinary surgeon spinal meningitis.

A marked improvement in the cleanliness and care of our slaughter houses have been noticed, so that we have been entirely free from complaint or even cause for complaint.

This has been a remarkably healthy year. The only exception was last winter, when a number of cases of pneumonia existed, many

ending in death. Malarial fever seems to be on the decline, and not a single case of cholera infantum, to my knowledge, happened in the township last summer.

Fanwood has had an epidemic of measles during the past year of a very mild type. Typhoid fever is unknown in our township, not a single case to my knowledge during the past three years.

LINDEN TOWNSHIP. - *Report from* Dr. P. P. MEDLIN, *Secretary.*

Malaria has been the most prevalent of any other disease in this township this year, and of that, much less than formerly. A few cases of pneumonia, but one of which was fatal.

The sanitary condition of the township has been carefully looked into, and found to be very good indeed.

SPRINGFIELD TOWNSHIP. - - *Report from* W. B. STILES.

There is a belt of swamp land lying in the village detrimental to health. It needs draining. The bed of the stream would have to be lowered several feet for a distance of two miles, and if the State would make an appropriation for such a purpose, it would be a grand, good thing. There is occasionally a case of malaria in our township.

The assessor makes all necessary inquiry as to losses of animals and contagious diseases, and is ever ready to report any contagious diseases known to him to the Local Board.

SUMMIT. - - *Report from* DAVID M. SMYTHE, *Secretary.*

The water-supply is from cisterns, wells and springs. Many of the springs are impregnated with iron. The water from the wells is comparatively pure. Many of the cisterns are divided by a soft brick partition, through which the rain-water percolates and is rendered thereby very pure.

The depositories for sewage are cesspools, with cemented bottoms and sides, emptied by the "odorless process," the refuse matter, &c., composted and used for fertilizing purposes.

Our township is free from malarial diseases. Several cases of dysentery have occurred this fall, confined to the aged, and, with but one exception, have yielded to appropriate remedies.

The Secretary of the Board keeps a full record of vital statistics for local reference.

The care over contagious diseases, the removal and burial of persons dying therefrom, is regulated by this Board.

WESTFIELD TOWNSHIP. - *Report from* JOHN M. C. MARSH, *Sec'y.*

The local Board has the past year established a system of ordinances for the protection of public health, which have been obeyed, and but very few complaints have been made to the Board for their enforcement.

WARREN COUNTY.

FRELINGHUYSEN TOWNSHIP. - *Report from* F. HORBACH, M.D.

During the year malarial diseases, mostly of the intermittent type, cholera morbus, cholera infantum and dysentery have prevailed to a slightly greater extent than for three or four years previously, but never reached the dimensions of an epidemic. The only epidemic was of scarlatina. Commencing in February it lasted until July, and numbered fifty-six cases. Of the whole number, forty-five were mild and eleven of the anginoid type. Nephritis, followed by anasarca, occurred in eight, acites in seven, and diphtheria in one case. Three cases were fatal, the one complicated by diphtheria and two from the complication of acute nephritis. Enlarged cervical glands occurred as a sequel in seventeen cases, and facial paralysis in one. A few sporadic cases of measles, and three cases of röthlen are noted. Not one case of typhoid has occurred, and only thirteen cases of pneumonitis.

GREENWICH TOWNSHIP. - *Report from* WILLIAM SHERRER, *Sec'y.*

The health of the township has been good. No contagious disease among man or animals. Some malaria still exists. The water-supply is from wells, cisterns and springs. There was complaint in one or two instances of cisterns, during the hot weather of July and August. I think it was owing to the condition of the roofs of the houses, they being very old and rotten. Houses are lighted by lamps, dwellings are heated by stoves, using coal as fuel in winter and wood in summer. In general, dwellings are not provided with fire-guards or escapes.

HACKETTSTOWN. - - *Report from* JOHN S. COOK, M.D.

The year was characterized by a visitation of scarlet fever in the borough, during the months of April and May, of an exceptionally fatal type. We seldom have this disease to prevail as an epidemic, or, at any rate, this has been our experience during the past thirty years. Malarial fever, of a typhoid type, prevailed during February,

March and April, to which your attention was called as it visited the C. C. Institute. Other than these, our town experienced its usual amount of sickness. The present year has been, if anything, more than usually free from any visitation of disease. Malaria has prevailed, but not so generally or of so severe a form as of last year. The Board has been called upon to abate a few nuisances, brought to their notice by personal complaint, and have endeavored to remove them. They have made an effort to instruct the citizens of our borough as to the necessity of removing all sources from which disease may be developed, as well as to the course to be pursued during their prevalence. Enclosed you will find several orders issued by direction of the Board. Much can be done toward the prevention and the abatement of disease by calling the attention of the citizens to its prevalence, and as to what may be done to abate or prevent it. Local Boards can accomplish but little, if they are not supported to a certain extent by public sentiment. Once arouse the citizens of any community to see the necessity of taking a certain course of action and they will respond by initiating and carrying out whatever course may further the accomplishment of the desired result. Our Board is at present laboring under this difficulty. They wish to remove a certain source of disease, but cannot accomplish their purpose until the citizens are brought to see the necessity of making the necessary outlay of money to secure the improvement the Board thinks should be made. They hope, however, at no distant day, to receive the desired coöperation of every good citizen, and thereby remove from our midst a very fertile source of disease.

The following petition was sent to the mayor:

To the Hon. Charles J. Ruse, Mayor, and the Common Council of the Borough of Hackettstown:

At a meeting of the Board of Health, on the 8th inst., called by the President and regularly organized, to act upon a petition in writing and signed by three of our citizens, in which a complaint was presented against the drain or sewer running from Main street to the slough at the head of Bower's pond; the Board having resolved itself into a committee of investigation to view the premises, instructed the President to bring the matter to the notice of your Honor, and through you to the Council of our borough.

The drain is in an unfinished condition, as it empties into the slough instead of into the stream, and leaves a large deposit of surface-water,

after every rain, to run through the swamp and be exposed to the action of the sun. The citizens living in the immediate vicinity are not only annoyed by the noxious vapors emanating therefrom, but residences have been rendered almost untenable by them and the adjacent surroundings. The Board would recommend the opening of a ditch running directly from the outlet of the drain to the stream, which would prevent the spreading of the water discharged from the drain, over the surface of the swamp.

The Board also directed the President to call your attention to the condition of the whole pond, believing, as they do, that it is a fruitful source of malaria. In support of this belief, they would direct your attention to the many cases of malarial fever which has afflicted the families living on the east side of Main street, from opposite Centre street to Mill and Willow Grove streets, and down these streets.

They would also call your attention to the condition of the sink built in Liberty street, near the saw-mill, to receive the surface-water formed in that neighborhood. That there have been serious cases of sickness in that vicinity, of a malarial character, and aggravated by the surroundings, no one can deny. The annoyance of the mud and water in the street, although great to those who are compelled to traverse it, is as nothing when contrasted with the deterioration in the value of the neighboring property, and the detriment to the health of the citizens living near it.

They would also suggest that the condition of our main street calls for your active attention. They would not advise the adoption of any particular plan to remedy the existing condition, but would leave it to the good judgment of your honorable body to do something to remove the existing reproach upon our reputation as a desirable place of residence; and also the threatening of a terrible epidemic which, in consequence of its condition, may visit us at no distant day.

If there be one point where public sentiment should be sensitive, it is in the sanitary condition of the dwellings of the people and their surroundings. If the earth upon which these dwellings are erected, and the soil in their immediate vicinity, is not properly drained, and is permitted to receive and retain the garbage and the surface-offal deposited upon them, thereby giving rise to noxious vapors and a vitiated atmosphere, for every one coming within their range to breathe, there must be but one result, an increase of sickness and disease, and the longer these conditions are permitted to exist the more sure must the ratio of deaths in the community be seriously increased. Such a

condition is of vital importance, so much so that the proper authorities ought not to content themselves with official recommendations, but take immediate action of a most radical nature for its suppression. While our Board, as at present constituted, might be individually benefited, in a business sense, by neglecting to take the proper course to remove, as far as possible, all sources of disease, they claim to be actuated by a higher and more noble motive—that of the promotion of the public welfare. While they regret that their action on a former occasion was not seconded by your predecessors in office, and did not receive the assistance their recommendations warranted, they fully believe that if the opposite course had been taken, not only the number of cases of serious sickness would have been lessened, but the valuable life of at least one of our citizens might have been saved. It is, therefore, for your honorable body to determine whether you take such action to remove these obstacles to the health of our community, by passing the proper ordinances having in view their suppression, or permit them to continue, not only to bring reproach upon the good name of our borough, by driving from us many who might seek to make investments for the purpose of becoming residents with us, but to expose our citizens to the developing dangers we have endeavored to bring to your notice, the ultimate result of which must be the production of disease, so long as these conditions exist, and must certainly result in the sacrifice of many valuable lives.

Sinks and Drains.—The Board of Health desire to call the attention of the citizens of the town to the importance and necessity of looking after the condition of their cesspools and drains. The fact is well recognized that a large percentage of the sickness prevailing in our towns and in closely-settled communities can be prevented by taking the precaution of having this portion of our dwellings correctly constructed and kept in good repair. Every citizen should see that their drains have a capacity large enough to carry away from dwellings whatever liquid material may be thrown into them; that every pipe connecting with their sinks is furnished with a perfect trap, and that their cesspools have capacity sufficient to receive all material coming into them, and that they should be of sufficient depth to insure against the surrounding soil becoming impregnated with noxious material. Those having water-closets in their dwellings should be aware of the fact that these conveniences are not safe unless the drain-pipes are properly ventilated, and this cannot be done unless these pipes run from the closet directly through the roof of the dwell-

ing, so as to secure a circulation and draught of air through them and prevent the syphoning of the traps in the pipes running to the bath-tubs and wash-basins; and when the connections are at all complicated and numerous, the traps should be ventilated through a properly-constructed pipe, which any competent plumber can apply. With these simple precautions, much sickness can be prevented, and when we read of the many fatal cases of diphtheria, typhoid and typho-malarial fever which have been traced to their neglect and which could have been prevented by their observance, we can see the necessity of taking every precaution which may make more secure the happiness, comfort and life of every citizen.

Scarlet Fever.—The experience of this community during the past two weeks should impress upon the mind of every citizen that the scarlet fever is in our midst, and prevailing in a form that, for this locality, is exceptionally fatal. It is essentially a disease of childhood and unmistakably contagious, and every one should see the necessity of using every means of preventing its dissemination. The first and most important step to take is to keep the healthy from the sick, and, where this is impossible, seclude the latter and disinfect as far as possible every article that has come in contact with them. This can be done by the use of chlorinated lime, carbolic acid, and strict attention to cleanliness, frequent changes of linen, which, after being changed, should be placed in water containing these disinfectants, and then washed. The strength of these solutions can be learned from the attending physician. The best mode of disinfection for articles that cannot be washed, is to expose them to a high degree of heat and then give them a thorough airing. There are small articles used about the sick, such as small pieces of linen, which can be burned. Patients should be separated from each other whenever possible, for experience has proved that the neglect of this precaution has increased the severity of individual cases.

Thorough ventilation of the sick-room is of the utmost importance, and this can be accomplished without subjecting the patient to a direct draught of air, although in those cases where the temperature runs exceptionally high, this is of no injury to the patient. Those recovering from the disease should not be allowed to mingle with the well or those who have never suffered from the disease, until the skin has become smooth and well, and not then until the body has been thoroughly washed and dressed in clean, fresh clothes. To prevent the spreading of scarlet fever by means of well persons, brothers, sisters

and other members of the families of patients should be denied entrance to schools and public assemblies until the complete disappearance of the disease. These precautions are rendered the more necessary when we take into consideration the fact that even during an epidemic of a mild type, or when one or more members of the family have a mild form of the disease, a well child may take the disease in its malignant form and die, or may recover with some unavoidable sequel such as loss of sight or deafness. All display should be avoided at funerals of those who have died of scarlet fever, and the dead should be buried at the earliest possible hour circumstances will permit, and be kept shut off from all contact with the living during the time preparations are being made for the funeral, especially when the disease is of a severe or malignant type. Children should not be allowed to be present or take part in the funeral ceremonies. The opening of the coffin in the presence of the assembly of friends should not be permitted.

KNOWLTON TOWNSHIP. - *Report from* W. F. GREENE, M.D.

Malaria has been, during the past year, markedly on the increase in certain portions of the township. This increase is due to a variety of local causes, and to general atmospheric conditions. One of the former is the raising of a dam along Paulin's Kill, thus overflowing the low lands in the vicinity—the water remaining stationary and becoming stagnant. An undoubted cause is also the removal of trees and a thick, bushy growth covering a considerable area of marshy land in the vicinity of Hainesburgh and along Paulin's Kill, thus exposing the moist, marshy surface to the direct influence of the sun's rays. The great diurnal thermal changes during the past season have also been powerfully instrumental in producing this increase. Such rapid fluctuations of temperature, due in great part to the earth's nocturnal radiation of heat, very decidedly affect, according to medical authority, and indeed to common observation, the conditions of health, and exposure both to the midday heat and the night's chill appears to be a fruitful cause of malarial disease. Says an authority on this subject: "It is after or at sunset that the malarial influence prevails, and it tells most when a cold night follows a hot day." Watery exhalations also favor the increase of malarial disease. The above conditions, more especially that relating to atmospheric changes, have doubtless been influential also in the production of catarrhal fever, many cases having appeared of catarrhal inflammation of the mucous membrane

of the intestinal tract, accompanied with an unusually marked congestion of the membrane and copious sanguineous effusions.

All outbuildings seem to have been located with a proper regard to the water-supply, and, with a few exceptions, occupy the most advantageous positions in a sanitary point of view. Due attention also seems to be devoted to the cleanliness of these buildings, both in the removal of the accumulations when required and in the use of disinfectants.

Distemper, so called, appeared in one instance among horses. No spread of the disease was, however, reported.

OXFORD TOWNSHIP. *Report from* L. B. HOAGLAND, M.D., *Sec'y.*

During the months of May and June we had a very severe epidemic of measles in our township. In the town of Oxford about one-third of all the cases were followed by pneumonia, with a large proportion of deaths, principally due to careless nursing. Have also had an epidemic of mild scarlet fever, with no deaths.

WASHINGTON BOROUGH. *Report from* W. M. BAIRD, M.D., *Sec'y.*

Many cases of complaint have come before our Board the past year. The majority of these were easily disposed of, as the parties complained of would correct nuisances when the secretary would show them wherein they were at fault. With the first warm weather in the spring we had considerable complaint against the slaughter houses situated in borough limits. Some people were so radical as to demand their removal entirely from the borough limits. The Board, however, permitted them to remain, but insisted that the owners should keep them in such condition as would prevent their being a nuisance to any one. This they have done, and we have heard no further complaint.

During 1882 a public water-supply was brought to our town, thus making an increase in sewerage with no public sewers, and has been a means of considerable trouble. The most serious has been with the Washington Building and Loan Association, who own a large hotel property in the center of town. Their waste all emptied in a large cesspool, which had been full for over a year and was only kept from overflowing by frequently carting away part of the contents. But they became negligent as to keeping it down, and frequently allowed it to overflow and so become a nuisance. They then started to lay pipes to a small creek running through town, the pipes to carry the

overflow from the cesspool. The Board forbade this, as in dry weather the creek carried scarcely any water. Paying no attention to the Board, we secured a temporary injunction, and on the association agreeing to empty the contents of the cesspool in the creek only at such times as the creek carried a full supply of water and on approval of the Secretary of the Board of Health, and they paying the costs of the suit, we withdrew the suit. This suit has had an excellent effect, as it has convinced a strong association that they cannot defy the Board of Health any more than any other authorities. But the matter of sewerage is going to remain an important matter here until some means is provided for its disposal.

Lately the Secretary was asked to inspect the public school. This is a large two-story building, with garret and basement. They get their water from a cistern, and the privy-vaults are probably 100 feet from the building. In the basement is a steam-heating apparatus in one room, and the waste-pipes of this empty in a cesspool under the cement floor of the room. This became foul some years since, when the Trustees tore it up and found it to be simply a hogshead sunk in the ground. They made a brick cesspool, broken joints and arched over. Into this cesspool empty pipes from one-half the rooms upstairs, these pipes being connected with wash-basins in each room, and no trap of any kind.

In another room in the basement is another cesspool, into which empty the basins from the other half of the building, and no traps. This cesspool has never been taken up, and is presumably like the former in its original state—simply a hogshead sunk in the ground. An adjoining room in the basement has been fitted up recently for a primary department, on account of the over-crowded condition of the school.

It still remains to be seen what action the Board of Trustees will take in the matter. The argument already used is, that it cannot be seen why any expense should be incurred in changing when this has been there for a dozen years and no sickness has arisen. But we have an intelligent Board of Trustees, and I have no doubt they will correct it as soon as practicable. I think it about time that Boards of Education insist that teachers shall be sufficiently informed in sanitary matters to enter their protest against any such condition of affairs.

REPORT OF THE COMMITTEE OF PUBLIC ANALYSTS AND INSPECTORS OF THE STATE BOARD OF HEALTH.

BY PROF. A. R. LEEDS, CHAIRMAN.

HOBOKEN, January 17th, 1884.

E. M. Hunt, M.D., Secretary of the State Board of Health:

DEAR SIR—I transmit herewith the reports of the members of the Committee of Public Analysts and Inspectors, duly appointed by the State Board of Health. This committee was called together shortly after its appointment, and its members undertook to enforce in their several districts the provisions of the law concerning kerosene, to analyze the samples of milk condemned by the inspectors thereof, and to prosecute offenders against the law concerning the adulteration of food. I transmit herewith the reports of the analysts and inspectors.

The principal new feature of the work done during the past year has been the steps taken to carry into effect the provisions of the law concerning kerosene. The extension of the system of personal inspection, already begun with the most encouraging success, will result in the exclusion from the New Jersey market of oil below the standard prescribed by the State law.

From a valuable report by Prof. Cornwall, upon "Malt Beverages and their Adulterations," it will be seen that no adulterations were detected in a considerable number of samples of beer submitted to analysis, and in their percentage of alcohol they were of full strength. But safety to the consumer, and the proper standard of quality, are only to be secured by a system of constant oversight and inspection. The best interests of both manufacturer and consumer are most effectually served in this way.

At the request of the State Board of Health and the State Inspector of Milk, the Committee of Analysts made a careful re-examination of the composition of the milk produced and sold in the State, to ascertain whether the standard prescribed by the law for market milk had been set too high. The results of all the analyses, both individually and collectively, go to show that this is not the case. To lower the standard, in opposition to the fair and impartial evidence thus obtained, would be for the State to put a premium on the production and sale of inferior milk. The State Inspector of Milk and his assistants have already performed a service of most calculable value, and, in gratitude therefor, their hands should be upheld and strengthened by maintenance of the law as at present existing.

It now remains for the same system of personal inspection and control, which has been inaugurated in the case of kerosene and milk, to be extended to the articles intended to be defended from adulteration by the general law relating to the "Adulteration of Food, Drink and Drugs." This work can be best accomplished by a State officer, specifically intrusted with carrying the provisions of this law into effect. The gentlemen who have given their services to the State Board of Health, in some instances with none, in all the others for a nominal remuneration, in order that the public might be informed, by means of reliable investigations, of the adulterations actually practiced, have accomplished this preliminary work faithfully and well. The work of the future is that of carrying the cases, after the fact of adulteration has been established, into the courts of law, and no one but an executive officer, properly authorized and remunerated, would be able so to do.

REPORT OF DR. T. B. STILLMAN, SPECIAL DISTRICT INSPECTOR, AS MADE TO PROF. A. R. LEEDS.

Dear Sir—In submitting this partial report on the examinations of illuminating oils, &c., for this district, I would respectfully state:

When the new law went into effect, July, 1883, the retail dealers, as well as the grocers, were entirely ignorant of the law's requirements respecting the flashing-point, &c. I applied to E. M. Hunt, Secretary State Board of Health of New Jersey, and obtained 500 copies of the circular issued July, 1883, relating to the inspection of oils, which circular also included the law as amended, to take effect in July, 1883. From a few examinations personally made in the city of Hoboken, I found that nearly all the grocers sold two qualities of oil, viz: first, "Amber oil," having a flashing-point varying from 85° F. to 92° F., and selling at from eleven to thirteen cents per gallon; second, "White oil," or, as some called it, "Astral oil," having a flashing-point vary-

ing from 96° F. to 102° F., and selling for from fourteen to sixteen cents per gallon. The first oil, "Amber oil," does not come up to the test (100° F. flash) as required by law, and in every instance I could have commenced suit; but as many of the grocers had purchased this oil, not by flash test, but as 130° test, they evidently were not the proper parties to sue, but the wholesale dealers; and as this oil, in most cases, had been purchased before the law went into effect, I considered it better to notify each dealer personally of the new law, and by also leaving one of the circulars relating to the subject as issued by the State Board of Health. By this means all of the dealers in Hoboken, and part of Jersey City, have been notified, and have more or less complied with the law by refusing to purchase or sell any oil except "White oil," standing a test of 100° F. flash. Nearly all the first-class grocers refuse to sell the "Amber oil," as the margin of profit is small and the risk of $500 fine too great; and the cases where I have found the "Amber oil" sold are among the grocers supplying the poorer classes of the population. It would seem to be unfair to sue these grocers, but it would be just and right to make the wholesale dealers and refiners of the oils responsible. Not only this, but the actual "flash test," not "fire test," should be upon each barrel as sold. Most all the oil is sold as 150° F. "fire test," and, as the fire test has no relation to the "flash" test, the grocer has no remedy against the dealer of whom he purchases.

Below I give the tests as indicated on a number of samples from this district:

No. 1. Grocer, T. Ward, Hudson street and Newark street, Hoboken.—"White oil." Flashes at 99.5° F.; sells at 15 cents per gallon.

No. 2. Grocer, Grothusen, Washington street and Fourth street.—"Amber oil." Flashes at 89° F.; purchased from wholesale dealer, A. J. Brockwedel, Jersey City; selling price, 12 cents per gallon.

No. 3. From Messrs. Gardner & Dudley, Orange, N. J.—"Amber oil." Flashes at 85° F.

No. 6. Grocer, Woltjen Bros., Fourth and Bloomfield streets, Hoboken.—"Astral oil." Flashes at 97° F.; wholesale dealer, E. A. Brockwedel, corner Harrison and Hoboken avenues; selling price, 15 cents per gallon.

No. 7. Grocer, John Wurdemann, Third and Bloomfield streets, Hoboken.—"Astral oil." Flashes at 97° F.; wholesale dealer, E. A. Brockwedel; selling price, 15 cents per gallon.

No. 8. Grocer, Charles Booken, Second and Bloomfield streets, Hoboken.—"Amber oil." Flashes at 88° F.; wholesale dealer, Gouche, West and Bank streets, New York; selling price, 11 cents per gallon.

No. 9. Grocer, Charles Booken.—"Astral oil." Flashes at 98.5° F.; wholesale dealer, J. Donnelly & Co., Jersey City; selling price, 15 cents per gallon.

No. 10. Grocer, Woltjen Bros., Hoboken.—"Astral oil." Flashes at 99.5° F.

No. 11. Grocer, Winters, Union Hill, N. J.—"Astral oil." Flashes at 99° F.; sells at 13 cents per gallon.

No. 12. Grocer, Moses Blank, Hoboken.—"Astral oil." Flashes at 100.5° F.; wholesale dealer, J. Donnelly & Co., Jersey City.

I could give you a large number of these tests, but they show about the same as the above, viz.: that the "Amber oil" is not suited for use with a flashing-point averaging 90° F., and should be excluded; that the "White oil" stands practically the test of 100° flash, though in a few instances 97°. Every grocer selling "Amber oil" has been notified that his oil is below standard, and not to sell it any more; if found doing so, suit will be commenced at once.

The amount of work required to inspect this district (Essex, Hudson, Middlesex and Union counties, the most populous in the State,) is great, and in Jersey City and Newark large quantities of this "Amber oil" are being sold, and no doubt also in other cities not yet inspected. *Personal inspection* is the only method by which poor oil can be driven out of the market. In Jersey City and Hoboken there are 708 grocers, and in Newark over 1,000 grocers, and as no attention is paid to circulars of the law sent by mail, I have found that the only method is as above stated, taking a sample of the oil personally and notifying the grocer of the result. In no instance can "Amber oil" be purchased now where I have tested the oil and informed the grocer of his liability to a $500 fine.

REPORT OF SHIPPEN WALLACE, ANALYST.

As one of the analysts appointed by you, I have the past year examined a large number of samples of kerosene, a number at the solicitation of individual sellers and users, a larger number obtained by me or at my suggestion. Of articles of food, I have had brought to me three samples of sugar, which proved, on analysis, to be adulterated with grape sugar. I have also had ten samples of "spices," which proved to be adulterated. The price at which they were sold indicated that they could not be pure. The analyses of milk which I made, according to the resolution passed at the meeting last fall, you already have my report of.

The samples of oil which I have tested represent, I think, the quality sold and used in this end of the State. They were mostly under the legal standard of 100°, but not to the extent I had expected to find. Quite a large quantity sold is 112° fire test, Pennsylvania. This oil will not be more, by my experience, than 92°–95°, New Jersey standard of 100° flash. One reason of its sale is that it is a few cents cheaper than higher-testing oil, and some persons claim, erroneously, that it gives a more brilliant light.

I have not found the law to be carried out by dealers in the matter of details as to labels, &c., in fact, a great many claim ignorance of there being any law on the subject. I have found that the sale of oil which is intended for use in lamps, and which is substantially naphtha under another name, such as "Genii oil," &c., has decreased to a very great extent. I know of two persons who continue to sell it, although informed that they render themselves liable to the penalties of the law. We may yet need to prosecute them.

I have a record of fifty-eight samples of kerosene tested, but a number I made no record of, knowing at the time that I had already examined the same dealers' oil a short time previously.

I append the temperature at which the oils flashed, with the instrument adopted by your Board being used. I do not embrace the naphtha samples, which burned at the ordinary temperature, and of which, as I stated, I found two persons selling for use in lamps.

Temperature of oil at flashing..	85°–90°	90°–95°	95°–100°	100 and over.
Number of samples...............	9	22	10	17

REPORT OF WM. K. NEWTON, M.D., ANALYST.

Kerosene Oil.—Sixty-one samples of illuminating oil, from various parts of the State, have been tested during the past year. Some of these samples were collected by myself, while others were sent me for examination.

Of the sixty-one samples tested, only five were below the standard, and, when notified, the dealers stopped the sale of this quality of oil.

The oil law has undoubtedly done much good, and that without expense to the State. The work has been done quietly but effectually.

Milk.—I was directed by your Board to obtain samples of pure milk, and submit them for analysis to the Public Analysts of this State, with the view of testing the State standard fixed by the milk adulteration law, to see if such a limit would do injustice to any producer.

I beg to report that I have attended to your instructions as follows:

Eight samples of pure commercial milk—that is, the mixed milk of more than one cow—were collected in West Jersey, and submitted to Shippen Wallace, Esq.

Eight samples were collected in Hunterdon county, and were submitted to Professors Leeds and Cornwall, duplicates being sent to each.

Nos. 616, 617, 618, dairy of Pickles & Brothers.
615, 619, dairy of P. Voorhees.
614, 620, dairy of G. A. Clum.
472, dairy of J. N. Pidcock; sent to Prof. Cornwall only.
373, dairy of J. N. Pidcock; sent to Prof. Leeds only.

The duplicate samples were to be analyzed as follows:

Prof. Leeds was to follow the Ritthausen process; Prof. Cornwall the Cairns process. This was to be done with the view of testing the methods, to see if concordant results could be obtained by two chemists working on the same sample, but with different methods.

Mr. Wallace, in his samples from other sources, followed the almost universally accepted method of Wauklyn.

SPECIMEN ANALYSES OF MILK AND METHODS.

BY MESSRS. LEEDS, CORNWALL AND WALLACE.

Analyses of eight samples of commercial milk from Hunterdon county, collected by the State Inspector of Milk, and received December 5th.

METHODS OF ANALYSIS.

Determination of Water.—5cc. of milk are weighed in a platinum capsule, coagulated by absolute alcohol, evaporated on a water-bath, brought to constant weight in an air-bath at 105°. (100° C. is not high enough; at 110° there is sometimes partial caramelizing, and therefore 105° is adopted as a satisfactory mean).

Total Solids.—Heat the residue first gently, then at low red-heat until completely incinerated; cool in desiccator and weigh.

Albuminoids and Fat,—10cc. of milk are weighed in a beaker, 100cc. of water added, the albuminoids precipitated by standard solution of copper sulphate, and the supernatant liquid exactly neutralized by standard solution of potash. After filtration and proper washing, the precipitate is dried by opening out the filter-paper on a glass plate and careful manipulation. It is then completely exhausted of fat by allowing it to swim for two hours in ether while properly supported in the filter-paper, enclosed within a funnel under a return-cooler. The ether is collected in a small weighed flask, and, after distillation, the fat is left behind and weighed. The albuminoids are determined by igniting the albuminates of copper, left behind after extraction of the fat.

Sugar.—In the aqueous filtrate from the albuminates and fat, sugar is determined by Fehling's solution.

After having employed for several years the older methods, I have adopted those above stated as being not more tedious than those usually followed, and much more accurate. They render it possible to make a complete analysis of milk in which the sum of the several constituents found should equal the amount of total solids, and thereby afford to that extent a proof of the accuracy of each step of analysis. Moreover, the methods have the elegance and precision of an assay for gold or silver, and I am quite sure that no one who has familiarized himself with them will willingly return to the older methods.

SAMPLE NO. 373.—DAIRY OF J. N. PIDCOCK, WHITE HOUSE.

Specific gravity			1.0288
Water		85.43 per cent.	
Total solids		14.57 "	
Fat	6.73	"	
Sugar	4.02	"	
Albuminoids	3.14	"	
Ash	0.62	"	
Sum		14.51 "	

SAMPLE NO. 614.—DAIRY OF G. A. CLUM, WHITE HOUSE.

Specific gravity			1.032
Water		84.75 per cent.	
Total solids		15.25 "	
Fat	5.98	"	
Sugar	4.37	"	
Albuminoids	4.21	"	
Ash	0.56	"	
Sum		15.12 "	

SAMPLE NO. 615.—DAIRY OF PETER VOORHEES, WHITE HOUSE.

Specific gravity			1.0323
Water		86.56 per cent.	
Total solids		13.41 "	
Fat	3.66	"	
Sugar	4.33	"	
Albuminoids	4.68	"	
Ash	0.68	"	
Sum		13.35 "	

SAMPLE NO. 616.—DAIRY OF PICKLES & BROS., WHITE HOUSE.

Specific gravity			1.308
Water		87.14 per cent.	
Total solids		12.86 "	
Fat	4.87	"	
Sugar	4.07	"	
Albuminoids	3.38	"	
Ash	0.64	"	
Sum		12.96 "	

SAMPLE NO. 617.—DAIRY OF PICKLES & BROS., WHITE HOUSE.

Specific gravity			1.0315
Water		87.01 per cent.	
Total solids		12.99 "	
Fat	3.55	"	
Sugar	4.23	"	
Albuminoids	4.49	"	
Ash	0.53	"	
Sum		12.80 "	

SAMPLE NO. 618.—DAIRY OF PICKLES & BROS.

Specific gravity			1.0315
Water		86.85 per cent.	
Total solids		13.15 "	
Fat	4.03	"	
Sugar	4.24	"	
Albuminoids	4.03	"	
Ash	0.62	"	
Sum		12.92 "	

SAMPLE NO. 620.—DAIRY OF G. A. CLUM.

Specific gravity			1.030
Water		82.93 per cent.	
Total solids		17.07 "	
Fat	8.10	"	
Sugar	4.28	"	
Albuminoids	3.90	"	
Ash	0.62	"	
Sum		16.90 "	

SAMPLE NO. 619.—DAIRY OF PETER VOORHEES.

Specific gravity			1.030
Water		86.61 per cent.	
Total solids		13.39 "	
Fat	5.26	"	
Sugar	3.93	"	
Albuminoids	3.65	"	
Ash	0.43	"	
Sum		13.27 "	

I have the pleasure to acknowledge, in the performance of these analyses, the coöperation of Dr. E. Everhart, Milk Inspector for Jersey City and Hoboken.

I enclose herewith my report on eight samples of milk received from Dr. Wm. K. Newton, about December 5th. All but the ash determinations were made as soon as the milk came to hand, the ash being determined at my leisure on the solids left after extraction of fat by Cairns' method. Cairns' method consists in weighing out five grammes of milk in a platinum dish, drying on water-bath; then in drying oven at 100° C., until the solids lose less than five milligrammes between two dryings, extending over half an hour. From the solids thus dried the fat is extracted by means of ether boiled with them in the dish, six separate portions of ether, of ten cubic centimeters each, being used. The ether is poured off each time (not through a filter) into a weighed beaker, evaporated at a gentle heat, the fat dried at 100° C., and weighed. The ash was determined by igniting the extracted solids in the dish at the lowest possible temperature, until free from carbon. The specific gravity was taken by weighing in a flask holding about twenty-five cubic centimeters of water, at 60° F., the temperature of the milk being 60° F., at the time of weighing.

MIXED MILK.

No.	ORIGIN OF SAMPLE.	Water.	Total Solids.	Fat.	Solids Not Fat.	Ash.	Sp. Gr.
616	Dairy of Pickles & Bros., White House..	87.18	12.82	3.43	9.39	0.664	1.0303
617	" " " " ..	87.11	12.89	3.19	9.70	0.702	1.0313
618	" " " " ..	86.80	13.20	3.52	9.68	0.691	1.0299
615	" Peter Voorhees, " ..	86.80	13.20	3.43	9.77	0.703	1.0315
619	" " " " ..	86.56	13.44	3.74	9.70	0.693	1.0298
614	" G. A. Clum, " ..	84.83	15.17	5.17	10.00	0.721	1.0299
620	" " " " ..	83.39	16.61	6.08	10.53	0.750	1.0310
472	" J. N. Pidcock, " ..	85.55	14.45	4.73	9.72	0.691	1.0290

I enclose my analyses of twelve samples of herd milk, made for the State Board of Health, agreeable to the resolution adopted at the late meeting of the analysts. The samples were collected by and under the direction of Dr. Newton, by Deputy Milk Inspector Vandegrift and myself, and are known to be pure. They represent milk from herds in Burlington, Camden and Gloucester counties, the cows of which are of no particular breed, but come under the classification of "common," my object having been not to obtain the milk of cows known to yield a product of high standard, but that of those not possessed of any particular pedigree. These analyses do not show, therefore, the standard of the milk in the counties mentioned, as there are herds to be found there equal to any in the State, but they do show that the State standard of twelve per cent. milk solids is not, as is asserted by some, too high.

The method of analysis was that known as Wauklyn's, with some slight changes—the addition of a small quantity of absolute alcohol before evaporating to dryness. This method I consider the best and most satisfactory, the method of evaporating with sand having been shown to have many objections. The details of the analytical work I do not suppose you wish for. All the analyses were made in duplicate, and the formula of Mr. Helmer used in checking the "solids not fat" determination.

HERD MILK ANALYSES:

Total Solids.	Fat.	Solids Not Fat.	Ash.	Sp. Gr.	REMARKS.
13.50	3.93	9.57	.65	1.03132	These analyses represent milk from herds of from eight to sixteen milking cows, the cows being of no particular breed, but coming under the class known as "common," and are from Burlington, Camden and Gloucester counties, and no two herds being near together. The milk was known to be pure and a well-mixed sample of the herd.
13.88	4.65	9.23	.62	1.02900	
13.67	3.83	9.84	.70	1.03306	
13.38	3.69	9.69	.67	1.03132	
13.13	3.50	9.63	.60	1.03190	
13.85	4.15	9.70	.66	1.03248	
13.63	3.59	10.04	.70	1.03306	
13.55	4.55	9.00	.60	1.03016	
12.73	3.85	8.88	.58	1.02958	
13.98	4.34	9.64	.63	1.08190	
13.75	3.85	9.90	.54	1.03248	
13.36	4.13	9.23	.62	1.03045	
13.534	4.005	9.529	....	....	Average of the twelve analyses.

NOTE.—The amount of work done by the Committee of Analysts is thus briefly epitomized. The results of the milk analyses by different methods and by different experimenters, show a uniformity which will sustain the standard already adopted.

—*Secretary.*

MALT BEVERAGES AND THEIR ADULTERATIONS.

BY PROF. H. B. CORNWALL, PRINCETON, MEMBER OF COMMITTEE OF ANALYSTS.

It is universally admitted that the most wholesome malt beverages, including beers, ales, stouts, &c., are made by fermenting infusions of

malted barley with the addition of hops, the fermentation being induced by means of yeast.

The barley is steeped in water and then placed in heaps until the spontaneous rise in temperature has induced germination of the seed. At the proper time the vitality of the seed is destroyed by drying or roasting it, and the result is malt. The crushed malt is heated with water ("mashed"), and the infusion, or "wort," thus obtained is boiled with hops, and is then drawn off, rapidly cooled, and fermented with brewers' yeast in large vessels. Before the fermentation is entirely completed the yeast is removed and the beer put into casks, where it undergoes a very gradual after-fermentation.

During the malting process a portion of the starch of the grain is converted into malt sugar and dextrine, by the action of a nitrogenous compound, diastase, which forms at the same time. During the mashing the diastase acts on the remainder of the starch with a similar result. The hops impart to the finished beverage wholesome tonic properties, a pleasant and peculiar aroma and an agreeable bitter taste, while they also aid greatly in preserving it.

During the fermentation induced by the yeast the greater part of the sugar is almost always converted into alcohol and carbonic acid; minute quantities of organic acids are also formed. If an acetic acid or excessive lactic acid fermentation occurs, through mismanagement or use of improper materials, the result is a sour and unwholesome beverage, which is often entirely worthless.

From the above it will be seen that it is possible to make something like beer from any saccharine infusion capable of undergoing alcoholic fermentation, and hence substitutes for barley or for barley malt are often used. Starch-yielding cereals or other materials, such as wheat, maize, rice, potatoes and others, are employed, or various kinds of starch, since all of these can be converted into fermentable sugars. Grape sugar, or glucose, and other sugars are also directly employed. The barley malt is, however, less liable to undergo irregular changes during brewing, while some of the other cereals are particularly liable to lactic acid fermentation, and beers produced from glucose are more prone to acetous fermentation.

It is therefore very desirable that malt beverages brewed from anything except malted barley should receive distinctive names, although their use is very widely extended.

As regards the substitutes for hops, which will be enumerated later, it may be stated here that, while probably no decidedly poisonous ones

are now used, if they ever were extensively, yet not one yields so good a product. Many of them are innocent and mildly efficient tonic bitters; others have a tendency to derange the digestive system, and some simply impart to beer a bitter taste; but none exert the general good influence of the hop. Stillé and Maisch (*National Dispensatory*), after enumerating various ailments in which the hop exerts a peculiarly beneficial action, owing to the association in it of a bitter tonic with a direct sedative of abnormal nervous action, add, that a pure and strongly hopped beer contains all the virtues of this agent, but ordinary malt liquors are too often fraudulently adulterated to deserve such praise.

The use of malt beverages, already widely spread, is constantly increasing; and although beer and ale are often regarded merely as stimulants, yet very many people regard them as in great part both meat and drink. In Germany, especially, beer is regarded as something more than a superfluous luxury. E. Reichardt (*Archiv der Pharmacie*, 1880,) uses the following language: "For the greater number of beer consumers it would be of the greatest importance to educate such landlords as are generally found in Bavaria, who themselves understand how to handle beer, and now, trusted with this important agent of nutrition, exercise much more care in preserving and retailing it." He has been deploring the common practice of keeping beer at too low a temperature just before tapping it, not only to prevent a badly-made beer from becoming unsalable, but in order that its coolness may cover up the taste of an already deteriorated article.

Post (*Grundriss der Chemischen Technologie*) says that, owing to the increased consumption of beer, the art of brewing is emerging from an empirical occupation and is rapidly establishing itself as a science, clearly understood and adapted to its end, while schools of brewing have recently been established in several German towns.

Alb. Schmidt (*Archiv der Pharmacie*, 1878,) says: "Whatever may be thought of the direct nutritious value of beer, it is unquestionably to be removed from the class of luxuries and placed among the agents of nutrition, because the happy combination of refreshing, thirst-quenching properties of normal beer with a moderate nutritious effect (through the carbonic acid on the one hand and the extractives, dextrine, sugar and salts, especially phosphates, on the other,) render it a refreshing and strengthening beverage. It forms, for instance, in South Germany, an important part of the frugal meals of the working

classes, and in this part of the country (Ratisbon) the enjoyment of a certain quantity of beer is necessary for the most humble daily laborer, and furnishes him also, in a certain sense, a means of nourishment." He adds: "As it at present often reaches the consumer, beer does not indeed deserve the name of a nourishing agent, since its adulterations are extraordinarily numerous and widely spread. Adulterations of beer may be divided into two classes—the use of improper means to improve deteriorated beer, and the substitution of cheaper materials for malt and hops."

Here it may be as well to state that the substitution of glucose for malt, while it may increase the amount of alcohol, lessens the nourishing power of the beer, because glucose yields none of the solid extract which is furnished in considerable quantity by malt.

In accordance with a request from the Board of Health of New Jersey, the writer has examined a number of samples of what is commonly known as lager beer, the samples being from various sources. Some were bottled beer, others ordinary beer, intended for immediate use. Two were samples of well-known and favorite brands. The examination was confined to a determination of the alcohol, solid extract and chlorides, together with a qualitative test for certain foreign bitter principles, mostly derived from the hop substitutes said to be most frequently employed.

Beer and malt liquors in general contain water, carbonic acid, alcohol (ethylic), malt sugar, dextrine, resinous and gummy matters, bitter extractive, albuminoids, small quantities of glycerine, lactic, acetic and succinic acids, and salts. The percentage of alcohol and of "extract," consisting principally of the sugar, dextrine, albuminoids, bitter principles and salts, affords a convenient means of comparing different kinds of malt liquors, and it will be found that the proportions of alcohol and extract vary considerably. When glucose or similar saccharine substances have been used, the beer, &c., will be deficient in extract.

Post gives the following as the characteristics of a good beer: A proper proportion of alcohol; a "natural" aroma, dependent on the use of hops; perfect clearness; a sparkling and sufficiently foamy appearance; sufficient viscosity (dependent on the nature and amount of the solid extract), and a refreshing, vinous, sweetly-bitter taste. The description will be recognized by connoisseurs as an accurate one.

The following table, from Post, shows approximately the percentage of alcohol and extract in various beers:

	Alcohol.	Extract.
Bavarian Lager Beer	3.1–3.9	4.0–4.6
Munich Bock	4.3–4 8	8.6–9.4
Vienna Lager Beer	2.7–4.4	4.0–8.0
Pilsen Lager Beer	3.4–4.6	4.8–5.7
Culmbacher Beer	4.2	4.6

Blyth (*Manual of Practical Chemistry*) gives the following table:

	Alcohol.	Malt Extract.
London Porter (Barclay & Perkins)	5.4	6.0
London Porter	6.9	6.8
Scotch Ale	8.5	10.9
Burton Ale	5.9	14.5

In the report of the State Board of Health of New York, for 1881–82, the average of nineteen samples of lager beer tested for the Board, was given as follows: Alcohol, 2.781 per cent. (highest, 4.14; lowest, 1.45); extractive matter, 6.047 (highest, 7.26; lowest, 4.58). As will be seen hereafter, in this article, the average percentage of alcohol in the ten samples tested for our State Board of Health was decidedly higher.

The complete analysis of beer is a complex operation, requiring the determination of specific gravity, carbonic acid, alcohol, total extract, sugar, dextrine, albuminoids, glycerine, degree of acidity (usually reported as lactic acid), ash, phosphoric acid and chlorides, together with tests for hop substitutes, alkalies or alkaline earths (used to correct acidity), glycerine, salicylic acid and other substances which may have been used to improve a deteriorated article or to preserve the beer.

As has been already stated, the tests for the present report were confined to a determination of the specific gravity, alcohol, extract and chlorides, with an examination for certain foreign bitter principles. The determination of the alcohol, extract and specific gravity furnish, together with the physical properties, smell and taste of the beer, important indications as to the quality of the latter and the probable use of malt substitutes.

The estimations of the alcohol and extract were made by Ballings' indirect method, as given by A. Schmidt, (*Archiv der Pharmacie*, 1878); the chlorine (being the measure of the salt and other chlorides present) was made as Blyth directs, by extracting the charred residue from seventy cubic centimeters of beer with water, filtering and estimating the chlorine in the filtrate by standard solution of silver nitrate.

These determinations were all made by Dr. L. W. McCay, in the laboratory of the John C. Green School of Science, at Princeton.

The English authorities consider any amount of chlorine corresponding to less than fifty grains of common salt per gallon as admissible, and in none of the samples did the salt exceed thirty grains, while in general it fell below ten. The method of estimating the alcohol and extract was as follows: After removing the carbonic acid from the beer by violently agitating it in a closed flask and passing air through the liquid, the specific gravity of the beer is taken; then 100 cubic centimeters is weighed in a porcelain dish, evaporated to one-third of its original volume, cooled and water added, until the first weight of dish and beer is again reached. The watery extract solution is then filtered, its specific gravity is taken, and, by means of proper tables, the percentage of extract corresponding to the observed specific gravity is obtained. By subtracting the specific gravity of the beer before evaporation from that after evaporation, and then subtracting this difference from 1.000 (the specific gravity of water), we obtain a figure representing the specific gravity of a dilute alcohol, equal in alcoholic strength to the beer.

Dr. McCay obtained the results given below:

Sample.	Specific Gravity.	Alcohol, Per Cent.	Extracts, Per Cent.
1	1.0155	4.11	5.6
2	1.0124	4.25	5.0
3	1.0093	3 52	4.4
4	1.0136	4.47	5 3
5	1.0188	4.64	6.7
6	1.0227	4.29	7.5
7	1.0175	5.16	6.5
8	1.0265	4.58	8.6
9	1.0191	3.94	6.5
10	1.0153	3.88	5.5
Average......	....	4.284	6.16

As a check on the alcohol determination, the writer made two direct determinations by distilling the alcohol from the beer (neutralized with caustic baryta), and determining the specific gravity of the alcoholic distillate. This was done in the case of two of the beers, Nos. 5 and 8, and he obtained for these respectively, 4.55 and 4.29 per cent. of alcohol. The indirect method, according to Schmidt's examples, is apt to give results a little too high, but it is certain that all of the above beers were of full strength. They exhibit no abnormal proportions of alcohol and extract, as compared with published

analyses of German lager beers, but it is not impossible that some of them may owe a part of their alcohol to the use of glucose or similar saccharine substances.

No. 17 contained chlorine equivalent to nearly thirty grains of salt per gallon.

Several of them were not perfectly clear, which is always a sign of some defect, and one had an unpleasant odor. One had an unusually sweet taste, and it could be said of only a small proportion of them that they were really perfect beers, although, with the exception of the one that had a disagreeable odor, it could not be said that any of them were manifestly unwholesome.

The writer subjected all of the above samples to a thorough test for the following foreign bitter principles, which includes the greater number, according to Schmidt, of such substances as exist in the hop substitutes which are believed, with more or less reason, to have been used: Aloes, buckbean, gentian, willow bark, colchicum, colocynth, *cocculus indicus*, *nux vomica*, quassia, wormwood and picric acid. The method employed was Wittstein's, as modified by A. Schmidt (*loc. cit.*) A brief description of it is here given.

A liter of the beer is concentrated to a syrup, and this is thoroughly extracted twice with alcohol of about ninety-four per cent., the alcohol is filtered, evaporated and the residual syrup specially tested as follows:

1. A little of it is diluted with three parts of water, and a bit of white woolen yarn left in it for an hour. If the yarn, after thorough washing in water, is yellow, picric acid may be present. To prove this, the wool is extracted with ammonia, the solution evaporated to a trifling residue and treated with a few drops of solution of cyanide of potassium. The least quantity of picric acid will then produce a red color of potassium isopurpurate.

2. The greater part of the syrup is shaken with six parts of benzol, the treatment is repeated with fresh benzol, and the two benzol extracts evaporated by gentle heating. The residue may contain, besides hop bitters, strychnin, brucin, colocynthin, colchicin and traces of aloëtin (the latter being disregarded). The residue is divided into three parts, one being treated with pure sulphuric acid, another with nitric acid of sp. gr. 1.33–1.4, and the third with sulphuric acid and a little grain of potassium bichromate. Colocynthin would be indicated by a red color caused by the sulphuric acid alone; brucin by a

red color caused by the nitric acid; colchicin by a violet color with this acid; strychnin by a blue or violet color, rapidly changing to red, under treatment with the sulphuric acid and bichromate of potassium.

3. The residue just shaken with benzol is freed from the small residue of this by gentle warming, and is then shaken with amylic alcohol, which may take up picrotoxin, aloin or salicin, and only in such case will taste bitter. A portion of it is evaporated at the ordinary temperature on a glass plate, when picrotoxin would be shown by delicate, white crystalline formations. The remainder is divided into two portions, to one of which caustic potash solution is added, when the presence of aloes would cause a fine purple-red solution, while the characteristic odor of aloes would also be noticed. The remainder is best tested for salicin by adding sulphuric acid, a small grain of potassium bichromate and a few drops of water, and warming the mixture to obtain the characteristic odor of salicylous acid (salicylal).

4. The residue, which has been shaken with benzol and amylic alcohol, is freed from the latter by means of blotting paper and shaken with absolute ether. This dissolves the hop bitter and any absinthin present. The ether is evaporated, and the use of absinth detected by the characteristic wormwood odor, as also by the fact that sulphuric acid would yield with it a yellowish-brown color, quickly changing to violet-blue, and hydrochloric acid (1.135 sp. gr.) would give a green color, changing to fine blue.

5. In the residue which has been shaken with ether, tests are made for the characteristic constituents of buckbean, quassia and gentian, provided it still has a decidedly bitter taste. The residue is freed from ether, dissolved in a little water, filtered if necessary, and a part warmed with dilute sulphuric acid. The characteristic odor of menyanthol would indicate that buckbean had been used. Another part is heated with a strongly ammoniacal silver solution. Should a silver mirror form, menyanthin or gentipicrin would be indicated (in the latter case the treatment with sulphuric acid would yield no characteristic odor.) If quassia is present, no reduction of silver ensues. Dragendorff does not regard the detection of gentian as certain.

None of the samples of beer tested by the writer gave any indication of the presence of anything not normal to beer. The residues from the various operations gave none of the characteristic reactions mentioned above for foreign bitter principles, while scarcely any difference in taste, odor or behavior of the residues could be detected.

It would appear, from the tests here recorded, that at the present time the use of any substitute for hops cannot be very extensive, and also that at least a very fair proportion of malt is commonly used in the brewing of even common lager beer.

In view of the fact that different opinions often prevail, it may be well here to present statements of various authorities as to the adulterations of malt liquors said to have been detected. It will be seen that in many cases, more especially as to the alleged use of poisonous bitter principles, opinions differ.

A. Almen (*Archiv der Pharmacie*, 1879,) states that in the course of investigations in Sweden, in 1871, foreign bitter principles were not uncommonly found in beers, and specifies quassia, menyanthin or a closely related principle, and absinthin. He adds that of late years such adulterations have been very rarely detected, and thinks that there has been for the most part an unwarranted fear that injurious hop substitutes are used.

Dragendorff (*Ermittelung von Giften*) says that foreign bitter principles are not seldom added to beer to lessen the consumption of hops. "Such an addition is an imposition on the public, which is not to be lightly regarded, *hops being employed not for their bitterness alone*, and it is the duty of the government to take cognizance of such proceedings."

Stillé and Maisch (*National Dispensatory*) state that *cocculus indicus* is said to prevent the secondary fermentation of liquors, and for this purpose it is sometimes added to malt liquors at the risk of poisoning those who drink them.

Hassell (*Food, its Adulterations, &c.*,) reports that Phillips found that *cocculus indicus* had been used in the case of two out of twenty samples of adulterated beer, and that tobacco had been used in one. (These were tested some years ago.)

Blyth (*Manual of Practical Chemistry*) states that the bitter principles of beer are occasionally derived solely from the hop, but are very commonly supplemented by so-called hop substitutes, and adds that samples of these all contained quassia, while portions of the following plants were identified: calumba, chirata, gentian and wormwood. He also states that picric acid has certainly been discovered, and picrotoxin is strongly suspected.

Post (*Grundriss der Chemischen Technologie*) says that, as unauthorized hop substitutes, other plants have, in a few isolated instances, been used: wormwood, quassia, buckbean, colchicum, &c.

Parkes (*Practical Hygiene*) gives the following list of deleterious substances whose use in liquors is forbidden by the Licensing Act (England) of 1872: *cocculus indicus*, salt, copperas, opium, Indian hemp, strychnin, tobacco, darnel seed, extract of logwood, salts of zinc or lead, alum and any other extract or compound of any of the above ingredients. It will be observed that many of the substances already mentioned are not included in this list. Parkes also enumerates the following among other adulterants that are used: sulphuric acid, to "age" the beer; a mixture of alum, salt and copperas, to "head" it; carminatives, as capsicum and grains of paradise, to give it pungency. He does not consider the use of *cocculus indicus* as proven.

Wittstein, (*Archiv der Pharmacie*, 1875,) after enumerating the bitter principles already referred to in the description of Schmidt's process for their detection, given in this report, says all the plants containing them, or else the bitter principles themselves, are so marked in their nature that smaller quantities of them will replace the hop, so far as bitterness is concerned, but they cannot afford the aroma nor the tannin and hop resin so important in making beer. He classifies buckbean, gentian, wormwood and quassia among the innocuous substitutes; aloes and colocynth are more dangerous on account of their purging properties. Colchicum, *cocculus indicus*, *nux vomica* and picric acid are absolutely poisonous, but he says that, so far as he knows, none of them have ever been certainly detected, possibly on account of imperfect methods of analysis, or because they were not present in the beers examined. The methods have been much improved of late, but nevertheless in many cases these foreign substances will be vainly sought for, both because they are not used so commonly as is believed and because only a very high price of hops would lead a brewer to employ other materials, which not only fail to produce so good and lasting a beer, but would often cause suspicion by the nature of the beer brewed with them. The fact that more *cocculus indicus* is imported into Germany than can be used as medicine, he thinks may be largely explained by its use as a vermin exterminator or as a means of paralyzing and thus catching fish. At the same time, Wittstein expressly states that he does not mean to intimate that this and other hop substitutes are not used, and he proceeds to give a method for their detection.

A. Schmidt (*loc. cit.*) admits that poisonous foreign bitter principles may have been found in beer, but far less frequently than is sup-

posed; indeed, he regards it as a highly improbable thing that opium, tobacco, *nux vomica* or other poisons should be used in Germany. Good methods exist for the detection at least of the presence of some foreign bitter principles, even if it is not always possible to assert just which one it may be.

There seems to be no reason to doubt that foreign bitter principles, not altogether harmless, are sometimes used in brewing the commoner grades of malt liquors, but probably only when hops are high-priced, and also probably by no means so commonly as is often supposed. If a beer has an intensely bitter taste, or one that persists long in the mouth, the presence of foreign bitters may be suspected, and the writer well remembers a glass of ale which produced, not many years ago, so lasting and intensely bitter a taste in his mouth as to excite not only surprise but apprehension. It was unquestionably not hop bitter, although no evil results followed.

Malt liquors are of sufficient importance to warrant a public oversight of their manufacture and sale, in the interests of public health. The use of hurtful hop substitutes, of ingredients for concealing the defects of such beverages, and the addition, by retailers, of water to increase their quantity, should all be rendered dangerous to brewers and dealers. In the interests both of health and temperance, mild malt liquors should be removed from suspicion of injurious properties.

REPORT OF THE MILK INSPECTOR.

WM. K. NEWTON, M.D., PATERSON, N. J.

Ezra M. Hunt, M.D., Secretary State Board of Health.

SIR—I hand you herewith my fourth annual report.

An act was passed by the last session of the Legislature, so amending the milk law that all tests should be made at the station from which the milk should be shipped.

The law in force, states that no complaint shall be made until the suspected milk shall have been analyzed, hence, to require such a test or analysis to be made at the shipping point, would practically stop all the work of inspection, and render the statute inoperative; a result probably not desired by the advocates of the amendment.

The attention of Governor Ludlow was called to this, and other inconsistencies in the amendment, and he withheld his signature.

Upon the earnest solicitation of producers in the northern and western sections of the State, a law was enacted prohibiting the sale of skimmed milk, but this was made applicable to cities of the first class only, to wit, Newark and Jersey City.

The utility of such a special law may well be questioned, for if it be wrong to sell impoverished milk in cities of the first class, why is it not wrong or impolitic to sell it in cities of the second or third class? As an example of this inconsistency, we may state that while the sale of skimmed milk is forbidden in Jersey City, it may be disposed of across the city line in Hoboken.

The law to prevent the sale of impure milk has worked exceedingly well this year, and it is to be hoped that the Legislature will refuse to sanction any attempt to alter or weaken it, especially so, when it is now known that the law has been declared to be constitutional by the Supreme Court, and needs only careful administration to insure justice to all.

The work during the past year has been energetically pushed forward, and, by the appointment of assistants, nearly every portion of the State has been brought under the operation of the law.

The State was divided into sections, and three assistants were appointed.

Dr. Edgar Everhart, of Stevens Institute, Hoboken, has had charge of the work of local inspection in Hoboken and Jersey City, this being his second year, and he has accomplished excellent results. The local supply of these cities is now in a very fair condition.

Seventeen complaints were made by him against persons violating the law. These were disposed of as follows: Six were fined $50 each; one person had his penalty

remitted on account of mitigating circumstances; one paid part of his fine, and then left the State, and nine were fined, but appealed their cases to higher courts.

Dr. Everhart is paid a small salary by the State.

Thomas B. Rogers, D.V.S., of Westville, Gloucester county, has inspected in the southern and western portions of the State, including the seaside resorts therein situated. The milk supply of Camden, Millville, Gloucester, Atlantic City, Cape May, Ocean City, and other places, has received his constant attention. Besides this work, he has visited a large number of dairy farms, noting the condition of the cattle and their surroundings, and making comparisons of the quality of the milk as produced, with that which is sold in our cities and towns. He, being a veterinarian, was able to make valuable investigations into the sanitary condition of milch cows, and, as a result of his experience, expresses the opinion that the work of the inspector should extend beyond the mere testing of milk to detect adulteration, and should embrace the surveillance of the herd. This opinion endorses what I have for a long time claimed, that notice should be taken of the health of the cows from which we obtain milk, and that all milk produced by animals out of health, should be kept out of our markets.

The result of Dr. Rogers' work has been very encouraging in that it has bettered the quality of the milk sold in the southern and western part of the State. Dr. Rogers was paid a small salary, a portion of which was allowed by the State, the remainder and his traveling expenses being paid by me.

Mr. Peter L. Vandegrift, of Burlington, was engaged for the work of inspection in Burlington county and the adjacent dairy sections. He has proved himself a most excellent officer, being always courteous and pleasant, and, furthermore, being possessed of that very commendable virtue, so necessary in this work, namely, reticence. Mr. Vandegrift has inspected the milk shipped from Kinkora, Columbus, Mt. Holly, Burlington and Jobstown, also the milk in the wagons at Bordentown, White Hill, Florence, Mt. Holly and Burlington. He has kept a record of each inspection, noting in a book the temperature and lactometer reading, and, according to instructions, has taken a sample of every can of milk falling below the specific gravity, 1.029, this being done for the purpose of having an analysis made. At first many samples were taken, but as the work of inspection went on the quality of the milk was bettered, so that at a recent inspection he failed to find any below the standard. In one instance, at Kinkora, the total solids went up from 10.50 per cent. to 13.62 per cent. as a result of the watchfulness of the inspector. No expense was incurred to the State by Mr. Vandegrift.

At Newark, Paterson and Vineland the local authorities have had charge of the work of inspection without expense to the State.

In Newark, Mr. Henry Negles, a competent and conscientious inspector, has done well and merits the earnest support of the city government. The complaints in this city have been made under the food adulteration law, as the city attorney did not deem the milk law sufficient for the purpose.

At Vineland we have an example of what can be accomplished, in the way of regulating the milk-supply, by an earnest Health Board. In this town the quality of the milk sold has been kept excellent by the constant surveillance of the members of the Board, and work has not only been well done but without expense.

Personally, I have attended to those portions of the State not embraced in the above statement. The dairy sections in the counties of Sussex, Morris, Essex, Hunterdon, Passaic, Warren and Middlesex have been frequently visited and the milk

there produced tested. It is encouraging to note that never before has the milk produced and sold in the State been of such general excellence, and the work of four years has just begun to bear fruit.

The past year has been an extremely busy one and more efficient work has been done than ever before. Besides the inspection of milk I have collected many samples of pure milk, for the purpose of testing the standard adopted by the State, the result of which work will be stated further on.

After some five years of practical experience in this line of sanitary work, I am able to say that the addition of water and the abstraction of cream comprise about all the methods employed for the purpose of adulterating or impoverishing milk. In some sections of the State, notably Atlantic City and other seaside resorts, a few dealers have been in the habit of adding preservatives, such as boric acid, sodium biborate and akaline carbonates, but this practice has been checked. One case where annatto had been added was reported by Dr. Rogers. From many experimental tests made of milk thus treated we are now able to detect very accurately all such such adulterations.

In my last report I mentioned that some cases, where complaints had been made for violations of the law, remained undecided. Of these I shall refer to three which have been settled by the Supreme Court.

In August, 1882, complaints were made at Camden, against three persons for selling milk adulterated with water. After many delays the trials took place in January, 1883, resulting in a conviction, and a penalty of $50 was imposed in each case. The defendants, feeling aggrieved at the action of the court, and being informed by their lawyer that the law was not constitutional, took their cases on a writ of *certiorari* to the Supreme Court in February of this year. The argument of counsel was heard at the June term and a decision given by the court in November, 1883.

Charles V. D. Joline, Esq., of Camden, appeared as my attorney, prepared the brief and made the argument in my favor. The decision was prepared by Justice Reed, was concurred in by the court and in the main endorses the law. As this decision affects the Public Health Laws of the State, I shall quote the principal features. The Food Adulteration Law, the Milk Adulteration Law and the Health Laws all provide for a method of summary proceedings, for it is argued that if a nuisance, source of foulness, impure food or bad meat, is injurious to the public health, the danger must be removed without loss of time; protracted suits would, as a measure, permit harm to be done, hence rapid action is provided by law.

The reasons presented by the prosecutors of the writ for asking the Supreme Court to decide that the law was not constitutional, are as follows: 1st. That it embraces two objects instead of one. 2d. That it provides for the arbitrary divestiture of the property of the citizen without due process of law. 3d. That it is a judicial act, deciding upon the character and admissibility of testimony. 4th. That it adjudges a forfeiture of the rights and property of the citizen without a judicial hearing and judgment, without due notice, and without a trial by jury.

In regard to the first point, the court says:

"That the design of the Legislature is single, namely, to secure the sale of wholesome milk. The second section of the act provides for the punishment of those who shall sell, or offer for sale, &c., any impure, adulterated or unwholesome milk. It further provides for the punishment of those who shall adulterate milk, or who shall keep cows in a crowded or unhealthy condition, or feed the same on food that produces impure, diseased or unwholesome milk, or shall feed cows on anything of an unwhole-

some nature. * * * The third section declares that the addition of water or any other substance is an adulteration; and milk that is obtained from animals that are fed on unwholesome food, or milk that has been exposed to the emanations from a person sick with any contagious disease, is impure. This is all directed against the production and sale of impure milk. * * * The subsequent sections, fixing the legal standard to which all milk shall be subjected by analysis, fixing the penalties to be imposed, directing the method of procedure in prosecutions for violation, and establishing the duties of the public analyst and of the State Inspector, are details appropriately directed to the execution of the single design intended to be secured by the legislation. Upon inspection of the body of the statute, no incongruous subjects are intermingled within the purview of the constitutional interdiction. * * * There is a difficulty, however, arising from the manner in which the act is entitled. * * * The perplexity springs from the inaccurate particularity by which, in the title, the scope of the legislation is expressed. * * * The constitution does not require a detailed, but a general expression of the scope of the enactment, and the danger of attempting to specialize the minutiæ of the legislation is apparent when, as in this act, there is at least one prohibition, which is clearly beyond the object indicated by the title, while clearly within the general object of the legislation. * * * The title is 'An act to prevent the adulteration and to regulate the sale of milk.' * * *

"Adulteration means to debase by the admixture of foreign materials. This is not only the literary significance of the word, but its meaning, also, is defined by the statute itself. * * * The distinction is drawn with clear lines between adulteration and impure and unwholesome milk. * * *

"The prohibition in the second section of the act is aimed at both the adulteration and the production of unwholesome milk by other methods. * * * It is not limited to the sale of adulterated or impure milk, or the having possession, with intent to sell, but is also directed at the act of adulteration, and the act of producing, by other methods, unwholesome milk. * * * The latter prohibition is, in my judgment, clearly outside of the object of the legislation as expressed by the title. As to the remaining parts of the statute, I think they are covered by the title The regulation of the sale of milk is a general, but a sufficient expression of the enactment of all the guards thrown by this act around the vending of an article of daily consumption. The provision for inspecting it, the prohibition against selling it, if impure or under a certain standard, is within the general notion expressed by the terms regulating its sale. * * *

"And so, also, the having possession of this quality of milk, with an intent to sell, is equally within the power of legislative interdiction under this title. The offensive part of the prohibited act is the intent to sell, the design to perpetrate the act, the regulation of which is the expressed object of the legislation. * * * The presence of the prohibition, already stated as foreign to the title, upon a well-settled rule of constitutional construction, does not vitiate the remaining portion of the act. * * * It can be eliminated from the act, leaving the residue of the act operative; and it is within the valid provisions of the act, that the prohibition upon which these prosecutions are grounded, is found. * * *

"The second branch of the constitutional objection to the statute is grounded upon the provisions of the 9th section, which empowers the milk inspector, in case he shall upon inspection find any milk which has been adulterated, to condemn the same and pour it upon the ground, etc. * * * This portion of the act is not involved in the present proceedings, * * * but as the objection has been elaborately argued it may be of use to remark that this clause does not seem obnoxious to the criticism to which it has been subjected. * * * That the title to all private property is held subject to the paramount consideration of the public health and safety of the entire public, is too well settled for discussion. It is equally well established that the authority inherent in the State under the title of police power, enables the Legislature to fix upon certain kinds of property, or upon the manner in which property is used, the brand of noxiousness to public safety and health. * * * And when the character of a nuisance has been so affixed, it is a frequent exercise of legislative power, in addition to the visitation of a penalty to be recovered by action or imprisonment upon conviction under indictment, to also provide for the abatement of the nuisance itself by means of a seizure and destruction of the property itself. * * * The exercise of the power is illustrated

by the numerous statutes in other States, which have received judicial sanction; among others those providing for the seizure and destruction of liquors, the arrest and sale of straying animals, the impounding and destruction of dogs, and for the seizure and destruction of illegally baked bread. *Sedg. Stat. and Const. Law*, 434 *note*, 455 *note*. * * *

"In the case of *Wells* v. *Snover*, 13 *Vr*. 341, this court sanctions the act of a fish warden in destroying a fish basket by virtue of the act of 1871 (*Rev. p.* 443), and the sanction is put upon the ground of the right to authorize an officer to abate a nuisance. * * *

"In the section of the act now under inspection, the authority of the officer to destroy rests upon the fact of adulteration or impurity of the milk, and the section further provides that if a subsequent analysis shall disclose the fact that the officer was mistaken in the result of his examination the owner is to be paid the value of the article destroyed. * * *

"The next constitutional objection is leveled at the provisions contained in the 4th and 8th sections of the act."

The 4th section provides that if the milk shall be shown, upon analysis by a member of the Council of Public Analysts or the chemist of the State Experiment Station, to contain less than twelve per cent. of milk solids, it shall be deemed to be adulterated.

The Court goes on to say:

"The objection raised against this section consists in the force which it is alleged is given to the analysis of the analyst. The contention is that the result reached by the chemist is, by force of the act, made conclusive evidence of the guilt of the defendant, and that such an exertion of power is beyond the ability of the Legislature. * * * In interpreting the significance of this clause, I think it is obvious that its design is to include within the kind of prohibited milk, such as shall not possess a certain standard of excellence. I think the standard so fixed was not intended to mark the absolute line between pure and diluted milk. The placing of the standard was to set up a mark to indicate where, in the judgment of the Legislature, the salubrity or full commercial value of milk ceased to exist. The section does not mean that the result of the analysis shall be conclusive evidence that the milk has in fact been adulterated, but it does mean that milk below a certain standard shall not be sold; therefore, when analysis discloses that condition, it shall be, for the purposes of that act, considered adulterated, so that by force of the other section it thereby becomes prohibited. * * *

In the State of Massachusetts, their act relative to the inspection of milk contains a clause similar to the one now in question; the difference being that ours provides for an analysis by a State officer, and theirs does not name the persons who make the analysis. The Supreme Court of that State, in the case of *The Commonwealth* v. *Evans*, 132 *Mass*. 11, held that this legislation was constitutional, and belonged to the class of police regulations designed to prevent frauds and protect the health of the people. * * *

"The clause as contained in the Massachusetts statute, is also found in the statutes of Rhode Island. In construing it in the recent case of *The State of Rhode Island* v. *Smith*, it was held that this clause was not intended as a rule of evidence, but defined a new offense. * * * I think the Legislature was not opposed to any fundamental or constitutional restriction."

As to section 8, where it says that the certificate of an analyst shall be taken as *prima facie* evidence, the court holds that this is objectionable, but that as the chemist in the cases under review, was examined in person, no constitutional objection can be urged in this particular case.

The last of the objections is, that the act makes no provision for a trial by jury. The Court says: "The law has so frequently been stated to the effect that the enforcement of regulations of the kind included within the statute by summary proceedings, before a magistrate alone, was not within the constitutional guaranty of trial by jury, that I think further remark would be profitless."

In deciding upon the complaints made in the cases under review, the court decides that they were defective, because no mention was made of the results of the analysis, and says that a valid complaint should include this fact, and the name of the analyst who made such an analysis. It is also held that all that is necessary is to prove that a certain sample of milk failed to come up to the standard fixed by the statute, and a complaint stating this, together with the name of the chemist, would constitute a true complaint of a violation of the law.

REVIEW OF THE FOUR YEARS' WORK.

It will be profitable and interesting to review the work done under the act to prevent the sale of impure milk during the past four years, and to note the results of its enforcement.

We shall note these results under two heads: first, from a commercial standpoint; secondly, from the sanitary bearings of the law.

The commercial relations of the law.—It may be remembered that, primarily, the law to regulate the sale of milk was enacted to protect our farmers from the injurious effects due to the sale of impure and impoverished milk, and was intended to enable them to obtain better prices for their commodity, by reducing the quantity of impure milk put upon the market.

When the question was first agitated, in 1879, the farmers in Sussex, Hunterdon, Morris, Essex and Union counties were only able to obtain extremely low prices, barely equal to the cost of production. Not only was the price kept down, but the market was flooded with skimmed milk by the many creameries in this and New York State, the tendency of which was to maintain a surplus in the market, and reduce the price obtainable for pure milk. It was important, then, to reduce the amount of impure milk offered for sale, and thus to increase the demand for a strictly pure article. For this purpose the law was framed, and we shall now see whether the end sought for has been attained.

It was the custom, heretofore, for the dealers in New York City to dictate to the farmers the price to be paid. This was done from six months to a year in advance, and the producer was rarely consulted as to the terms, the price having little to do with the ratio of supply and demand. Thus, in 1879, a scale of prices was fixed, allowing twenty-eight cents a quart on the yearly basis; that is, when the monthly rates were added together, an annual rate of twenty-eight cents was obtained. This will be explained further on. It was when these low figures prevailed that the attempt was made to get some protection from the State, so that poor milk should be driven from the market, thus increasing the demand for a good article, and establishing a better scale of prices.

The first milk law under which an inspector was appointed, was enacted in the early part of 1880, and when this law took effect and the work of inspection began, thus reducing the quantity of impure milk offered for sale, the yearly rate advanced to thirty-four and one-half cents a quart.

It is easy to calculate the effect of this advance in price upon the receipts obtained by farmers from the sale of milk.

I give in the following table, the monthly and yearly prices, also the amount obtained from the sale of one forty-quart can of milk each year, and the gradual increment will be noticed.

PRICE PAID EACH MONTH, PER QUART.

	1879.	1880.	1881.	1882.	1883.
January	2½ cents.	3 cents.	3½ cents.	4 cents.	4 cents.
February	2½ "	3 "	3 "	4 "	3 "
March	2½ "	3 "	3 "	3 "	3¼ "
April	2 "	2½ "	2¾ "	3 "	3 "
May	2 "	2 "	2 "	2½ "	2½ "
June	2 "	2 "	2 "	2½ "	2½ "
July	2 "	2½ "	2 "	2½ "	3 "
August	2 "	2½ "	2½ "	3 "	3 "
September	2 "	3 "	3 "	3½ "	3½ "
October	2½ "	3 "	4 "	3½ "	3¼ "
November	3 "	4 "	4 "	3½ "	4 "
December	3 "	4 "	4 "	4 "	4 "
Yearly average	28 cents.	34½ cents.	35¾ cents.	39 cents.	39 cents
Price obtained for each 40-quart can.	$340.60	$419.60	$435 00	$474.80	$474 80

It will be observed that there is a difference between the price obtained for a can of milk in 1879, and that for 1883, of $134.20, in favor of the farmer. The amount of benefit derived by the producers of Sussex, Hunterdon, Essex, Union, Morris and Middlesex counties may be roughly estimated when it is known that not less than 414,000 cans of milk are sold each year by the farmers of these counties. While I do not claim that this increase in value is due wholly to the protection afforded by the law, I do assert that without this law but little would have been accomplished in the way of establishing better prices.

The law has also enabled the producers, in the above-mentioned counties, to effect an organization for the purpose of controlling the trade and compelling dealers in New York city to pay more equitable prices. In the revolt against dictation by dealers (which occurred in the winter of 1882–3, and was popularly known as the "milk strike,") great assistance was rendered by the law, through the inspector, and by the New York inspectors, in the way of keeping impoverished milk off the market. The victory for the farmers which ensued not only gave them control but drove out of business many dishonest and irresponsible men and reduced the sale of impure milk very markedly.

To sum up, I may say that the milk law has been of great value to the producers in northern New Jersey.

As a commercial measure the statute has not affected West Jersey to the same extent, for the reason that prices seem to be based more upon the quality of the milk offered for sale than elsewhere in the State and hence was not so much needed. Prices vary from four and a half to seven and a half cents a quart, wholesale, in this portion of the State, the latter price being paid for very rich Alderney or Jersey milk. The dealers in the cities seem to be benefited, however, for they are protected from fraudulent practices.

The result from a sanitary standpoint.—While we cannot estimate the improved condition of the public health, nor derive much information from the study of vital statistics, in relation to the diminished sale of impure milk, yet probably infantile mortality has been reduced since the quality of the milk sold in our large cities has

been regulated by law. We throw this out as a hint, for of course we cannot bring dollars and cents to bear on the problem as we did in the review of the commercial side of the question.

When the work of inspection was begun in 1880, the amount of adulterated and impoverished milk sold in the State was enormous, and no city or town could be visited without finding the supply more or less impure. The quality of that shipped on the railroads was often impure.

During the four years embraced in this review nearly every city and town of any importance has been visited, and I am in a position to say that to-day cases of flagrant violation of the law are extremely rare, and none but the criminal will run the risk of detection which must sooner or latter overtake him. I can also say that never has the milk-supply of our State been in such an excellent condition.

THE STATE STANDARD.

Section 4 of the milk law requires that milk which shall contain less than twelve per centum of milk solids shall not be sold, and, for the purposes of the act, milk which may fall below this limit shall be deemed to be adulterated.

Probably no one section of the law has been so much questioned. Why was it sanctioned or required? What right has the State to fix an arbitrary standard? Why was twelve per centum settled upon as the limit? These and other questions have been asked, and we may reply that it was required because, as the law demands a chemical analysis, it is absolutely necessary to set up a limit in order to establish a criterion by which to judge milk, and in case of trial at court to have a standard with which the sample in question might be compared. As to the right of the State to fix a limit, it may be said that the State avails itself of an inherent right and requires, for instance, that a gallon measure shall contain so many cubic inches, or that a barrel of flour shall weigh so much, or that, in branding or packing fish or pork, certain arbitrary methods shall be employed, or in the sale of illuminating oils only a certain grade shall be used for house illumination and fixes an arbitrary flash test to be used; without giving any more instances we may state that the grade, weight or other qualities may be and are fixed by statute. It has been decided by the Supreme Court, in the cases previously quoted, that the State has the right to make a standard for milk, and that standard may not only insist on purity, but may demand a certain degree of excellence.

In other States a limit for milk is set up by law; thus, in Rhode Island, twelve per cent. of solids, and two and one half per cent. of fat is called for; in Massachusetts, thirteen per cent. of solids is required. The Society of Public Analysts of Great Britain, also, has fixed upon an arbitrary limit of nine per cent. of solids not fat, which is higher than our standard.

Why was twelve per cent. fixed upon as the limit in this State? It was found, after repeated trials, that pure milk from a healthy cow rarely or never fell below that limit when analyzed by a fair but accurate method of analysis, and I may say that it would be impossible to obtain a sample of the mixed milk of two or more healthy cows that would, upon analysis, yield less total solids than the standard calls for. But, to judge this standard, a method of analysis similar to, and not more rigorous than those used by the analysts of this State must be employed, for it would not be fair to offer other analyses obtained by crude and inaccurate methods. Any method which permits the addition to the milk of any adventitious substances,

such as sand, plaster of Paris, sulphate of barium, etc., must not be employed in testing the standard, for these methods have been proved to be inaccurate, and have been abandoned by all chemists who have had much to do with milk analysis. The chemical side of the question will be discussed further on.

A word here as to the claim that the standard is an average. In answer to this, I shall say that the standard is not an *average*, but is a *limit*, and was not arrived at by averaging, but was adopted when it was conclusively shown that the milk produced in this State never went below a *limit* of twelve per cent. of milk solids.

Persons who object to the standard would usually resist the legalizing of any limit, and the objection is not so much against the limit fixed by law, as it is against any limit whatever.

With the view of testing the State standard to see if any injustice can be done by it, I have had samples collected in nearly all the counties in the State, and have submitted them to the public analysts of this State for analysis, and the results can be seen by reference to the following tables. No attempt was made to select herds or cows, but the only restriction placed on the collection of samples was, that the purity of each one should be undoubted, and none were to be submitted as pure milk, unless the collector actually saw them milked from healthy cows.

All the samples in Tables II. and III. were collected by Dr. Rogers, Mr. Vandegrift or myself, hence, their authenticity can be vouched for.

Besides this series of investigations, the State Board of Health advised a full and fair re-examination to see whether there was any possibility of harm to the rights of producers from the standard. Samples were collected, as in the other case, and were analyzed by Prof. A. R. Leeds, of Stevens Institute; by Prof. H. B. Cornwall, of Princeton, and by Shippen Wallace, of Burlington. As I have not seen the reports I cannot express my opinion, but the full returns will be found in this volume.

In closing this branch of the subject I shall say that the offer made each year for the past three years is now renewed, and any person doubting the accuracy of the State standard, and thinking that any cow in his herd produces milk below the limit, has the privilege and the right to call on the inspector, or any analyst, or on the State Board of Health, for a test analysis to be made. The only restriction placed on this offer is that the sample shall be drawn from the cow in the presence of some authorized person, in order that there shall be no intentional or unintentional mistakes.

Table I. is compiled from reports made by the State Agricultural Experiment Station. The cattle were undoubtedly better fed and cared for than the average herds throughout the State, and hence the solids are perhaps high; but to offset the favorable factors the method of analysis employed at the Station is one calculated to give lower results, as to solids, than any method used by our analysts.

The method of analysis followed at the Station is as follows: Total solids are obtained by drying a weighed quantity of milk, with ignited sand, at 212° F. till constant weight has been reached.

Fat is gotten by taking a weighed quantity of milk, evaporating to dryness with ignited sand, drying thoroughly at 212° F. and then extracting the fat with ether in an extraction apparatus.

The ash in the analyses given in the table was determined by difference, which will probably account for the large percentage. (First Annual Report, page 56.)

TABLE I.

ANALYSES MADE AT THE NEW JERSEY EXPERIMENT STATION.

	Total Solids.	Fat.	Solids not Fat	Ash.	Sp. Gr.	
Corn meal ration; herd of 3 cows; average of 4 daily analyses	13.88	4.16	9.72	......	1.0344	Bulletin No. XXIV.
Sorghum meal ration; herd of 3 cows; average of 4 daily analyses	14.12	4.29	9.83	......	1.0348	" " "
20 days feeding trial; herd of 3 cows; average of 5 daily analyses	13.55	4.49	9.06	......	1.0327	" " XIX.
	14.01	4.42	9.59	......	1.0343	" " "
	13.55	4.27	9.28	......	1.0340	" " "
	13.87	4.27	9.60	......	1.0340	" " "
	13.87	4.58	9.29	......	1.0330	" " "
	14.51	4.53	9.98	......	1.0346	" " "
College Farm; mixed milk 6 Jersey cows; average of 13 analyses	14.72	5.21	9.51	.91	1.033	1st An. Rep. of Station.
Taylor's Herd; mixed milk 6 Jersey cows; average of 13 analyses	14.72	5.21	9.51	.91	1.033	" " "
College Farm; mixed milk 6 Native cows; average of 13 analyses	13.57	4.49	9.08	.92	1.033	" " "
College Farm; mixed milk 5 Ayrshire cows; average of 13 analyses	12.85	4.33	8.52	.72	1.031	" " "
Kelsey's Herd; mixed milk 6 Jersey cows; average of 13 analyses	14.51	5.19	9.32	.99	1.034	" " "
Dudley's Herd; mixed milk 6 Jersey cows; average of 13 analyses	14.88	5.20	9.68	.98	1.034	" " "

Table II. gives the results obtained by analyzing the milk of *individual* cows, and hence does not represent the milk of commerce, that being almost always the milk of two or more cows thoroughly mixed. The methods of analysis are noted, and will be described further on.

The specific gravity of each sample was taken on the balance. The ash was determined by ignition of the solids not fat.

Samples 10 and 11 were from imported Alderney cows: the small amount of total solids will be noted, and will surprise those who think that this quality of milk is always extremely rich.

Sample 12 was from an Alderney cow, two and one-half years old, belonging to Mr. S. W. Taylor, of Burlington. Sample 13 was from registered Alderney cow No. 5,548, belonging to Mr. Taylor's herd. The analysis is equal to that of cream.

TABLE II.

ANALYSES BY PUBLIC ANALYSTS OF NEW JERSEY—INDIVIDUAL COWS.

No.	Origin of Sample.	Time of Milking.	Breed.	Age.	No. of Calves.	Total Solids.	Fat.	Solids not Fat.	Ash.	Sp. Gr.	Methods of Analysis.	Analyst.
1	Passaic Co.......	Night	Holst'n	3	1	14.31	4.76	9.55	.66	1.033	Ritthausen.	A. R. Leeds.
2	"	"	Native..	8	3	12.61	3.30	9.31	.74	1.035	"	"
3	"	"	¾ Nat...	11	10	13.48	4.46	9.02	.75	1.0315	Cairns........	H. B. Cornwall.
4	"	Morn	" ...	11	10	13.62	4.36	9.26	.75	1.0325	"	"
5	"	Ngt	½ Jers.. ½ Nat..	6	5	12.51	3.50	9.01	.77	1.0324	"	"
6	"	Morn	" " ...	6	5	13.19	3.62	9.47	.77	1.0339	"	"
7	"	Ngt	¾ Jers.. ¼ Ald...	6	5	13.84	4.57	9.27	.70	1.0328	"	"
8	"	Morn	" ...	6	5	15.07	5.38	9.61	.78	1.0336	"	"
9	Sussex Co.........	Night	Ald'rny	4	...	15.18	6.06	9.12	.68	1.032	Ritthausen.	A. R. Leeds.
10	"	"	"	4	...	12.34	3.56	8.78	.48	1.031	"	"
11	"	"	"	5½	...	12.89	4.82	8.37	.59	1.030	"	"
12	Burlington Co...	....	"	2½	...	16.74	7.10	9.64	.62	1.0295	Wanklyn ...	S. Wallace.
13	" "	....	"	......	...	21.73	12.25	9.48	.66	1.0248	" ...	"

Table III. gives the analyses of *herd milk*, that is commercial milk, the mixed milk of two or more cows. This table represents the milk seen by the inspector and sold to consumers, hence it is more liable to be compared with the standard set up by law; and it is for this reason that so great a number of samples were collected and analyzed.

All these samples, with the exception of a few to be noted further on, were from herds made up of what is known as common cows; that is, none of the cows were of any particular breed. The herds vary from two to eighteen cows, and the ages from two to twelve years. The feed was pasture, bran, meal, ensilage, and in fact nearly everything that is fed to cattle. Some samples were from the sand dunes of the ocean counties, where it is said that the cattle get little but scrub oak and sea air.

With but nine exceptions the analyses represent herds, and, with these exceptions, the milk of the same herd does not appear twice in this table. I mention this for fear that some may think that a few herds were tabulated many times.

The sixty-five analyses represent fifty-eight herds.

As with the results in Table II., the method of analysis is noted. The specific gravity in each case was taken on the balance. The ash was determined by ignition of the solids not fat.

Samples 1, 2, 3, 6, 7, 8, 9, 10 and 11, were obtained in Sussex county and were taken from lots of forty quarts each, thoroughly mixed. Sample 4 was the mixed milk of seven native cows in Passaic county. Sample 5 was from Mercer county, from a twenty-quart can.

Sample 12 to 65, both inclusive, were collected in Burlington, Camden, Gloucester, Cape May and Cumberland counties.

Numbers 32 and 33 were what is called "off shore" milk and the cows were very poorly fed. The samples were collected with the expectation that the analysis would give results lower than the standard.

Samples 57, 58, 59, 60, 61, 62 and 63 were from a herd made up of the following description of cows; one cow, one-half Holstein; one, Guernsey; two, half Jersey, half Holstein; one, short horn; two, three-quarters Guernsey; seven cows; yield forty quarts.

Sample 64 was from the mixed milk of the noted herd of high grade Jersey cattle owned by Mr. C. H. Taylor, of Burlington.

Sample 65 was from the mixed milk of a similar herd, owned by Mr. W. S. Taylor, of the same place. The two latter samples are added to our list to give examples of exceedingly rich milk.

TABLE III.

ANALYSES BY THE PUBLIC ANALYSTS OF NEW JERSEY—HERD MILK.

No.	Total Solids	Fat.	Solids not Fat.	Ash.	Sp. Gr.	Method of Analysis.	Analyst.
1	12.29	3.80	8.49	.63	1 031	Ritthausen.	A. R. Leeds.
2	12.71	4.06	8.65	.73	1.031	"	" "
3	12 97	4.08	8.89	.68	1.030	"	" "
4	13.88	4.49	9.39	.66	1.032	"	" "
5	13.68	3.76	9.92	.71	1.031	Cairns.	H. B. Cornwall.
6	12.67	3.33	9.34	......	1.029	"	" "
7	13.99	4.13	9.85	......	1.032	"	" "
8	14.80	4.78	10.01	......	1.032	"	" "
9	14.21	3.87	10 34	......	1.032	"	" "
10	14 82	5.22	9.59	......	1.030	"	" "
11	13.97	3.85	10.11	......	1.032	"	" "
12	13.26	3.60	9.66	.64	1.0324	Wanklyn.	Shippen Wallace.
13	13.98	4.34	9.64	.63	1.0319	"	" "
14	13.50	3.94	9.56	.68	1.0319	"	" "
15	12.36	2.92	9.44	.66	1.0319	"	" "
16	13.75	3.85	9 90	.54	1.0324	"	" "
17	13.00	3.52	9.48	.68	1.0319	"	" "
18	12 92	3.44	9.48	.68	1.0319	"	" "
19	14 44	4.15	10.29	.62	1.0336	"	" "
20	14.34	4.22	10 12	.62	1.0330	"	" "
21	14 38	4.34	10.04	.62	1.0330	"	" "
22	13.42	3.52	9.90	.64	1.0324	"	" "
23	13.14	3.71	9.43	.62	1 0313	"	" "
24	14 29	4.93	9 36	.68	1.0330	"	" "
25	12.51	3.20	9.31	.66	1.0313	"	" "
26	13.55	4.55	9.00	.60	1.0301	"	" "
27	13.85	4.15	9.70	.66	1.0324	"	" "
28	13.05	3.67	9 38	.60	1.0306	"	" "
29	13.67	3.83	9.84	.70	1.0330	"	" "
30	13.63	3.59	10.04	.70	1.0330	"	" "
31	14.51	4.53	9.98	.71	1.0319	"	" "
32	12.16	2.72	9.44	.62	1.0319	"	" "
33	12 73	3.85	8.88	.58	1.0295	"	" "
34	13.87	4.04	9.83	.66	1.0324	"	" "
35	14.61	4.55	10 06	.68	1.0324	"	" "
36	13.38	3.69	9.69	.66	1.0313	"	" "
37	12.53	3.47	9.06	.62	1.0301	"	" "
38	12.60	3.60	9.00	.60	1.0301	"	" "
39	12.76	3 12	9.58	.65	1.0319	"	" "
40	12 55	3.12	9.43	.66	1.0319	"	" "
41	13.50	3 93	9.57	.68	1.0313	"	" "
42	13.13	3.50	9 63	.60	1.0313	"	" "
43	12 71	2.41	10.30	.72	1.0348	"	" "
44	12 92	3.30	9 62	.70	1.0319	"	" "
45	12.56	2.75	9.81	.70	1.0330	"	" "
46	13.36	4.13	9 23	.66	1.0304	"	" "
47	13 38	3.94	9 44	.67	1.0319	"	" "
48	13.91	4.37	9.54	.65	1 0307	"	" "
49	13.00	3.85	9.15	.60	1.0313	"	" "
50	13.48	4.05	9.43	.68	1.0307	"	" "
51	13.76	4.35	9.41	.68	1.0307	"	" "
52	13.88	4.65	9.23	.66	1.0290	"	" "

TABLE III.—*Continued.*

No.	Total Solids.	Fat.	Solids not Fat.	Ash.	Sp. Gr.	Method of Analysis.	Analyst.
53	12.76	3.01	9.75	.70	1.0324	Wanklyn.	Shippen Wallace.
54	13.14	3.46	9.68	.70	1.0324	"	" "
55	12.68	3.21	9.47	.64	1.0319	"	" "
56	12.94	3.76	9.18	.60	1.0301	"	" "
57	15.45	6.44	9.01	.68	1.0290	"	" "
58	15.02	5.76	9.26	.64	1.0290	"	" "
59	14.66	5.30	9.36	.66	1.0295	"	" "
60	14.30	4.94	9.36	.66	1.0301	"	" "
61	16.62	6.02	10.60	.68	1.0342	"	" "
62	15.19	4.97	10.22	.68	1.0330	"	" "
63	15.72	5.91	9.81	.67	1.0304	"	" "
64	22.08	12.83	9.24	.56	1.0240	"	" "
65	19.18	9.40	9.78	.60	1.0284	"	" "

METHODS OF MILK ANALYSIS USED BY THE PUBLIC ANALYSTS OF NEW JERSEY.

WANKLYN. *Milk solids.*—The milk is thoroughly mixed, and five grammes weighed out in a platinum dish. The dish is then placed on a water-bath, the water in the bath is made to boil vigorously and maintained boiling for *three hours.* At the expiration of this period, the milk in the dish will have completely dried up. The dish is now removed from the bath, its outside wiped dry, and itself and contents forthwith weighed.

The weight of the dish subtracted from the weight of conjoined dish and contents gives the weight of the milk solids in the five grammes of milk taken. By multiplying that weight by twenty, the per cent. is arrived at.

Fat.—The residue, milk solids, may be taken for the determination of the fat. Ether is poured into the dish, and heated to the boiling point, and poured out through a small filter. This operation must be repeated at least three times, each time the ethereal solution being poured out through the filter.

The ethereal solution of fat having been obtained, the next point to be attended to is the evaporation of the ether, and the getting of the residue of fat. This is done by evaporating off the ether and weighing as in the case of milk solids, the result being the fat. (Milk Analysis. A Practical Treatise, Etc., by J. Alfred Wanklyn. New York: 1874. Page 19.)

This method was brought out in England by Prof. Wanklyn, in 1870, and by it, during the past thirteen years, he has analyzed many thousands of samples. The method is adopted by the public analysts of Great Britain—who number nearly one hundred—and is the official method used under the Food Adulteration Act of that country.

We shall discuss this method in comparison with the others later on.

The standard of this State was established upon this process, as was also that of Rhode Island.

The following averages were obtained by Wanklyn's method:

Wanklyn, England, town milk	14.06	Total Solids.
" " country milk	12.45	"
J. Carter Bell, England, 181 cows	13.80	"
E. E. Calder, Rhode Island, 440 cows	12.77	"

CAIRNS. *Milk solids.*—The milk is thoroughly mixed, and five grammes weighed into a small platinum dish. Evaporate over a water-bath until the milk solids look dry; then dry in an air-bath at 100° to 105° C., for one hour to one and a half hours; weigh, and dry again, for one-half to three quarters of an hour, and weigh again. Repeat this treatment until the loss is less than five milligrammes. Weight of residue, minus dish, equals milk solids.

Fat.—Pour about 10cc. of ether on the milk solids, allow it to soak into the solids for a few minutes, place the dish on the water-bath and keep it there till the ether boils. Then, after drying the bottom of the dish, pour the ether into a weighed beaker. Repeat this treatment with ether about six times. Cover the beaker with a piece of filter paper, and evaporate off the ether over hot water. When the ether is all gone, dry the beaker in an air-bath at 100° to 105c., for about fifteen minutes. Weigh; the weight minus the weight of the beaker equals the fat.

The residue in the dish may also be weighed; the loss equals the fat. The two weighings of the fat, direct and indirect, should agree within about five milligrammes. (A Manual of Quantitative Chemical Analysis, by Frederick A. Cairns. Revised edition. New York: 1881. Page 204.) This method is taught at the School of Mines, Columbia College, New York, and is used by the New York analysts.

RITTHAUSEN. *Milk solids*—Weigh out five grammes of the milk in a platinum dish, add 5cc. of alcohol and evaporate to dryness on a water-bath. Dry at 100 degrees C. to constant weight.

Fat.—For the determination of the fat, that substance is precipitated with the albuminoids by a solution of cupric sulphate. For this process two solutions are required: (1.) A solution of Cu SO4, 5 H_2O, sixty-five grammes to the liter of water. (2.) A solution of KHO having a specific gravity of 1.048.

Weigh out 10 grammes of the milk in a weighed 150cc. beaker and add about 90cc. of water. Stir and add 3cc. of the copper solution, then add 1 2cc. of the solution of potash, being very careful that the re-action of the liquid should not become alkaline.

Allow the precipitate, which contains the albuminoids and all the fat, to settle, decant through a filter dried at 110° and weighed; when as much as possible has been decanted add about 100cc. of water, stir, allow to settle and again decant through the same filter. Finally, transfer the precipitate to the filter and wash until the total of the whole filtrate and washings amounts to just 250cc.

The filter with the precipitate is removed from the funnel and spread on a flat piece of glass and allowed to dry until the greenish mass can be easily cut with a knife-blade without sticking to it. The drying can be facilitated by subdividing the precipitate with a small spatula; still, it must not be carried so far that the mass becomes horn-like, otherwise the fat cannot be easily extracted. When drying has gone far enough, the filter and its contents are transferred to a Gerber's extraction apparatus and the fat extracted into a weighed flask. The ether is distilled from the flask and the fat dried at 100° C., cooled and weighed.

If the per cent. of the albuminoids is desired, proceed as follows: The filter and precipitate, from which the fat has been removed, are dried at 100° C, cooled and weighed; they are then burned completely in a platinum dish, and the ash plus the

CuO are weighed. The difference between the filter and the filter plus the precipitate minus the ash and CuO, gives the total amount of the albuminoids.

The precipitate of the albuminoids is so complete by the copper solution that even Millon's re-agent gives no precipitate in the supernatant fluid. The precipitate of the fat is purely mechanical, but it is perfect, every portion going down with the albuminoids.

A brief account of this method and a description of the extraction apparatus may be found in "Chemical and Physical Analysis of Milk," by N. Gerber, New York, 1882.

Dr. Edgar Everhart, Assistant in the Chemical Laboratory of Stevens Institute, kindly furnished me with notes on the process, which was introduced and is used by Prof. A. R. Leeds, who speaks very highly of its accuracy and the ease with which it is manipulated.

It was my intention to compare these methods, but, as I understand that Prof. Leeds and Prof. Cornwall will treat of this branch of the subject in their reports, I will add only a few brief notes.

It will be well to repeat, at this point, what was said before, that, if we are to judge the standard, or to compare samples of milk with it, a method of analysis equal to and not more rigorous than that by which it was adopted, should be employed. To use a process that will destroy some one of the ingredients, or that will falsify the results, would be unjust. What is required of the method is, that when a sample is submitted to two or more chemists for analysis, the results obtained by each shall be accurate and concordant. If this result can be obtained by each chemist, working by a different method, the problem is easy of solution; but if it is necessary that all shall use the same process, it seems to me very important that some one method should be fixed upon and used, to the exclusion of all others.

Without going into detail I will state that I am fully persuaded that Wanklyn's method of milk analysis is all that can be desired. It is accurate, and two or more analysts working at the same specimen can arrive at concordant results. Any method that requires prolonged evaporation or drying is very apt to get false figures, for the reason that such processes destroy or dehydrate the milk sugar, and thus make the total solids appear lower than they really are. The use of sand or any substance added to increase the bulk of the milk has been abandoned by nearly all chemists for the reason that not only is it impossible to get concordant results, but, as sand is a hygroscopic substance, accurate weighing is impossible or difficult.

As to the fat extraction, it may be said that where an extraction apparatus is used, such as Liebig's, Soxhlet's or Gerber's, where an almost constant circulation of ether is maintained through the milk solids, higher fat determinations will result than by the Wanklyn or Cairns methods. And if the ether be not dry, or if the solids contain much moisture, there is a source of error in the possibility of extracting some of the milk sugar, which result will cause the fat to appear greater than it is. But, with these few hints, I leave this branch of our topic for others to discuss.

In closing I would repeat what I have stated in former reports, that to do the work of inspection in a thorough manner and to accomplish better results, more attention must be given to the subject by local Boards of Health. It is clearly the duty of these Boards to interest themselves in this matter, and while a general oversight should be maintained by the State, the bulk of the work and the burden of expense should rest on local government.

I take this opportunity to thank my assistants and the analysts, for the excellent services rendered the State and the health interests of the people by them, at a very low rate of remuneration, hoping that their efforts will be appreciated.

CIRCULARS AND LAWS.

CIRCULAR No. XXXVII.

SCHOOL AND HEALTH CIRCULAR No. 3, FOR PARENTS, GUARDIANS, CHILDREN, TEACHERS AND TRUSTEES.

HEALTH, CHARACTER, AND INDUSTRY.

These are the three best things to have all through life.

POWER, SUCCESS, AND HAPPINESS

Are their companions. Without health, character may be good, but it has a burden to carry; without health, industry is tied down, or pulls too heavy a load; without health, power, success, and happiness have three of their best friends in trouble. Let us then learn all we can about health; how to have it; how to keep it; what use to make of it, as we go along with thirteen years of school life, between five and eighteen.

That is a poor school which takes away one's health, and to keep health is easier than to find it after it is lost.

TO PARENTS OR GUARDIANS.

See to it that the child goes to school in a proper condition. This means, first of all, cleanliness all over. A child not washed all over at least each week, with warm or cool water, is not fit for school. Some will need a bath oftener. Children need to wash the face and hands, and to comb and brush out the hair at night, as well as morning. Let the mouth be rinsed with water, morning and evening, or the teeth brushed, so as to have a pure breath.

Have clean, thin flannel for clothing, next to the skin, with such additional outside garments as may be necessary for warmth, and shoes and stockings that will protect the feet from dampness. A dry pair of socks and a clean handkerchief are not amiss in the satchel. Let no child start for school with damp clothing; when active, we can bear dampness a while, but to sit in wet clothing is always a risk. Tell the child, if damp or chilly, to let the teacher know it.

A good, plain, unhurried breakfast is always important to the school child. The young are better off without coffee or tea; but some may need a warm drink for breakfast in cold weather, such as sweetened water, sugar and milk, and water or

milk flavored with cocoa. If the child will not be at home and at dinner within five hours after the close of breakfast, have him carry a small and easily digested lunch, to eat at recess, or at an appointed time in school. It should be light bread and butter, with fruit or jelly, and not over-large, if there is to be a meal at home by two o'clock. Have the child chew before swallowing, as it cannot chew after swallowing, as cows do. Let every boy know that tobacco in any form is so injurious to growth and vigor as to make its use by him a breach of school laws and of good sense.

See that the child gets plenty of good sleep, in a well-aired room, and does not go to bed just from the book, so as to be tired and anxious about a lesson.

When the child is really unwell, do not send him to school just for the name of being punctual. The parent should judge and decide wisely, mindful that headache, pain, or weariness in a child always requires rest. If your child is sick, or if there is sickness in the family, have the judgment of your doctor as to the time of staying at home.

TO THE CHILD.

You must learn how to take care of your own health. Others may tell you; but experience and advice should early lead you to feel how important it is not to abuse the body. Read this leaflet and mind it. Help your parents and teachers to keep you clean and neat. Be clean in person, in thought, in word, in action. A child that has clean feet, clean hands, clean nails, clean ears, and combed hair, is generally clean and neat.

To get peevish or worried over a lesson is not wholesome. Get, if need be, a part of your lessons at home. The load is often too heavy because we try to carry too much of it at once, or in too short a time.

In sitting, do not lean over too much, or too constantly. While standing, stand erect. Neither fold the arms in front nor put them behind, but let them hang naturally and easily at the sides. In studying, try to have enough light without a glare; if light or print troubles you, tell the teacher. If you are really unwell, let him know it; a headache that may not require you to go home may be a reason for change of position, or rest from study; only be upright, and do not pretend. In all things seek to take good care of your health, since your happiness and usefulness so much depend upon it.

TO THE TEACHER.

Know that health and habits in reference thereto are important parts of the education you are seeking to conduct. In large schools, a steward or janitor should receive each pupil, and know that the child enters on the work of the day healthily; where no such person is provided, the teacher must include this with many other things in his care-taking.

Children must not hang damp and sometimes soiled overclothing in a close, unaired room, against other damp or wet garments. Each child's clothing should be kept by itself.

The regulation of heating and ventilation is very important; the thermometer should guide you as to heat. The sensations of those who are well, and who are properly clad, help much to guide as to moisture, warmth, purity of air, draught, etc. Air can often be let in through a sieve of wire, or between the two sashes, with a board strip beneath the lower one, when a direct draught would be hazardous.

Walls often need whitewashing, kalsomining or painting, and all wood-work should be frequently and thoroughly washed. Sweeping carefully under the desks and dusting

are important. The condition of the rooms, the distribution of desks, according to size of persons, light, variation in study and position, exercise, airing of rooms while empty, moderation of competition, assortment of work to the capacity of the child, and quickness to perceive the occasions for temporary variations and adjustments are essential in the skilled oversight of the teacher; he must feel that he has this charge to keep. It is a joy to get school-work out of a well child, and to help rather than to complicate inability and invalidism. Remember that the kind of day has something to do with the capacity for work. While light gymnastics should be practiced daily in all schools at stated periods, on rainy or cloudy days special exercises should be given, during which the room can be more thoroughly ventilated. Give zest and advice as to out-of-door as well as to indoor exercises.

Not only talk to the pupils about health, and enforce its rules, but train them in the practice of it, so that "errors in physical conduct or ideas will be as readily pointed out for amendment, as mistakes in grammar, pronunciation or behavior." Thus make them valid, instead of invalid; promote their well-fare, instead of their ill-fare, and enable them to do their work in life with ease instead of disease. Feebleness of constitution or special ailments, are too often the result of errors in the school discipline. More suffer and die from the frailities of ill health, thus acquired in childhood, than from diseases which are said to be caught.

WHAT SHALL A TEACHER DO ABOUT CONTAGIOUS DISEASES?

Acquaint parents, by this circular, or in some other way, with the fact that it is their duty not to convey, through their children, contagious diseases to others. If a child seems unwell, or you find out there is sickness in the house he lives in, inquire as to it. Ask the attending physician or Board of Health to apprise you of any house from which a pupil should not be received. Hold a physician or Board of Health responsible for the time of return to school. In cities, or during epidemics, a permit should be had. Prudence and judgment, but not systems to excite alarm, are required. Small-pox, scarlet fever and diphtheria, need special precautions.

TO TRUSTEES OR BOARDS OF EDUCATION.

You are in trust of all that relates to the school, having accepted an appointment as a guardian of the children, as well as of the teachers and the property. To you, the teachers and the scholars must look for adaptation of structure and furniture, and as the bond between themselves and the community. You must realize that the care of health is a part of education, and that this means, on your part, actual personal supervision, appeal and service; it means facilities for right administration as well as buildings. All the larger schools should have direct instruction in physical education.

The trustee must feel it to be his duty and his business to help in giving the child a fair chance for health and usefulness. The State seeks this for itself as well as for the child. No one can do more for it than the school trustee who will wisely look after the welfare of the child in the school, and mold the sentiment of the people in favor of proper arrangements.

Prevalent cleanliness inside of the building, on the grounds, and in all outhouses, must be secured; defects must be recognized, both as to their reality and the extent of the evils they cause. Neat and good housekeeping of the school home is indispensable. Often it is wise to have the judgment of ladies as to the care of the school rooms. Teachers need to be fully upheld in enforcing rules as to the personal habits of the pupils.

As New Jersey has free schools, in order to secure men and women with sound bodies, fitted for labor, with good character, and mental acquirements sufficient for some useful vocation in life, the overseers of these schools need so to plan as to insure these results. Thus, alone, can we have good citizens, and happy families, and prosperous industries.

Thus health, character and industry keep together as school friends and life friends, and power, success and happiness join their company. So the public school confers blessings on the people and on the State, securing power not less from sound bodies than from sound minds.

For various other items of advice, see Circular XXVIII. of this Board.

CIRCULAR XXXIX.

TO LOCAL BOARDS OF HEALTH.

All township Health Boards should hold a session at the spring meeting of the township committee, to consider any causes of preventable disease and how they are to be abated. The powers of such a Board are clearly defined in various acts, as enumerated in the Sixth Report (1883) of the State Board of Health (page 255, etc.) See especially chapter 155, laws of 1880; chapter 135, laws of 1881; chapter 155, laws of 1882, and chapter 105, 1883, a supplement to an act entitled "An act relating to Local Boards of Health." Under the law every city and every township *must* have its Board of Health.

The Board in townships consists of the township committee, the assessor and the township physician.

I. The Board should have accurate organization, so as to meet at a stated time, having its chairman and secretary, and keeping a record of its proceedings. Its rules of order are the same as other Boards met for the transaction of public business.

II. It is not merely a Board to hear complaints, but to get an accurate idea of evils which cause, or are known to prepare the way for, sickness and death. In one place it may be undrained land, so saturated with water and vegetable matter as by changes in temperature and moisture to give rise to fevers; in another locality it may be poor water-supply or defective sewers, or the want of a sewer system; in another, the careless disposal of garbage; in another, too near proximity of wells and outhouses; in another, cesspools which soak the ground with filth. But in any case, such a Board should be one of inquiry, to collect accurate facts and deal with real evidence. In most Boards will be found some one who knows how to collect and study facts, or keep them on hand for study until enough are gathered.

III. Such a Board needs to keep in view from year to year where sickness and death have occurred, and the causes thereof, to know the number of children born and living in their district, so as to know the age of the material subject to disease, and various other facts which, when observed with care, over a sufficient period, lead to conclusions as definite as those derived from a study of any other of the courses of nature.

Such a Board has great value as an educator of the public in the avoidance of the causes of ill health. It is in a position to advise and to acquaint the public with the various laws as to the prevention and abatement of evils prejudicial to health. Many bad household and town arrangements are those of ignorance, and are easily corrected when a better way is shown. The Board can also, by its circulars, ordinances and instructions, deter many from infringements which would otherwise occur, and thus act as a preventive of disease. Most Boards should have an executive officer, who should be informed as to the most dangerous nuisances and the best means of riddance. Cities need to have a special sanitary inspector, upon whose good judgment and knowledge they can rely for the correction of many evils as well as for the enforcement of the law when necessary.

IV. It is not necessary, under the general laws of the State, always to prove disobedience of an ordinance, but only that the thing complained of is contrary to the law. Ordinances are valuable as warnings or as defining more closely the scope of the law. It has been a mistake of many cities to promulgate too many ordinances and to enforce too few. A waste of dead letter makes administration less perfect. Neither do health laws or health codes supersede common law. They provide speedy modes of riddance, leaving any question of trespass to be decided afterwards.

It is important that special powers should be exercised in all that class of cases in which the usual process of courts would be too tardy, and that by inquiries and investigations and recommendations, Boards of Health should aid forward all efforts made under common law or under statutory provisions for appreciating the public health, so far as its protection falls under such jurisdiction.

The duty of discussing and exposing evils, of suggesting relief, of making recommendations, and of giving information is a great one. Boards of cities and townships do very much to prevent and abate evils, by the very facts which are brought out in their discussions, and by turning public attention to existing evils.

In our recent experience with small-pox, new evidence has been furnished how necessary it is to have such Boards in all localities, so that when any case of contagious disease, or any nuisance hazardous to health occurs, there may be no delay. The citizens of each precinct have the right to be able at once to find some authority charged with the duties specified in the law. Forethought is better than afterthought.

While the law requires expenses of over fifty dollars per year to be ordered or approved by the township committee, the township or town committee, or council of a city may authorize further expenditures, and in case of special meetings or service on the part of the Board, may compensate therefor, if the town committee, etc., so direct. In some special investigations the State aids to a limited extent.

When there is no township physician, the State Board of Health has the right to appoint a medical member of the Board.

There must be a report made in October of each year to the State Board, as required by law.

Health Boards have an important duty in co-operating with the city clerks or assessors in securing complete returns of marriages, births and deaths, certified copies of which can be had, by those entitled thereto, on application by letter to the Secretary of State.

With these properly returned, we are able to state from year to year, or through longer periods, the health of any locality. Thus any hearsay as to healthfulness or sickness can be corrected, and if any disease is found to prevail above a general average we detect causes and correct them. The progress of population and the causes

affecting the growth of sections can be studied, not merely for curiosity, but in the interests of political economy and social advancement. It is thus that whole communities have their health interests under supervision. As health is capital and wages, we thus look after a great condition of success. There is no more important census of population. It can only be secured at the time the events it records are occurring. If left to the end of the year, or for semi-decennial record, experience shows that the results are too imperfect for study. The law is now well complied with by ministers, physicians, etc., except when carelessness or postponement as to birth returns annoys town clerks and assessors and delays tabulation.

It is important that records of meetings and a copy of reports be kept in the township health book. This aids in future study. The State index and transcription of marriages, births and deaths, which is kept in full, furnishes data for comparison and enables localities to know their condition and what evils they need to guard. Cities now only need to transcribe the age, sex, date, number of street and cause of *death*, and to see that the blanks sent for record are properly filled. City clerks and Boards of Health should be able to tell each death that has occurred in any house through a series of years, as thus we find out local causes of disease.

The several reports of this Board clearly indicate the work to be done. Some of these cannot now be furnished, but the last report will aid much in this direction. Local Boards must see to it that all circulars, reports, etc., sent, are not carelessly retained by assessors or others, but passed over to each successive Board. We send such reports, as also all circulars and blanks, to any citizen on receipt of postal.

In addition to the duties indicated, Local Boards should notify us of any contagious diseases among animals, with the names and post office address of owners. The laws against adulteration of foods and drugs, against poor kerosene, and many others, come under the care of these Boards.

There is now enough law for most cases. What is most desirable is a comprehension of what is needed and proper to be done, and the doing of it by right methods. Those who have power to enforce a law, because of that power have far greater chances for persuasion in securing right action without legal process. But this must not mean delay or tampering with dangers to the health. We ask all Boards to become informed as to their duties, and then to perform them with that prudence, energy and determination which the circumstances of each case may require.

Any letters of inquiry may be addressed to the Secretary of the State Board or Bureau of Vital Statistics, Trenton.

We add a number of suggestive questions indicating what Boards of Health should know or inquire about. Some of these apply only to cities and some only to townships, but all are worthy of thought, according to the needs of each locality.

What is the area of the city or township?

What is the density of population?

What is the character of geological structure and soil?

What the natural drainage?

What the needs of additional drainage arising from structural alterations?

Are there ponds, or stagnant pools, or any other interferences with proper drainage?

Is there a sanitary map, so that the location of all underground pipes or the plan of all underground work and the contour of surface can be easily known?

Are plans devised or executed for proper drainage?

In cities, is foresight had as to public parks?

Are there any free baths?

Are there careful arrangements to *prevent* nuisances, as well as for their abatement?

Are cases of contagious disease reported to you either by the head of the family or by the physician?

Have you plans and provision for dealing with any case of contagion, such as small-pox, typhus fever, etc.?

Is there any sanitary inspection of school houses or other public buildings?

What trades or occupations are injuring the health of operatives?

Have factories any system of ventilation?

Are there factories of which the odor or refuse is a nuisance?

Are there slaughter houses which are a nuisance?

Is there any inspection of city stables, or cow pens or hog pens?

Is there any inquiry into the adulteration of milk, of food, or of drugs?

Is kerosene ever tested, or are there accidents therefrom?

Is a record kept of diseases, or of deaths, and their causes and locality, that you may compare different parts of the same city or township?

Do you aid the assessor or city clerk in securing the returns of marriages, births and deaths, so that the vital and essential conditions of local prosperity may be known?

Is vaccination systematically secured?

Does the assessor or city inspector regularly report to you any condition which he regards as hazardous to the public health?

HOUSES.

What is the condition of cellars and basements?

How are the walls as to dryness and dampness?

What fire-escapes or provisions for fire?

What the condition of tenement houses?

What is the water-supply of each house?

Is there a well or cistern supply? How many use wells instead of the public supply?

Are there any cesspools which have been once used and then filled up?

How near are cesspool, well and out-house?

Is there outside ventilation between the house-pipe system and the cesspool or sewer?

Is there a trap between it and the cesspool or sewer? Any grease trap?

Does the Board of Health know the sanitary condition of each house in those matters which most concern the health of the community?

If there are sewers, is their condition thoroughly known? Are they ventilated?

Are house connections watched and carefully superintended when new buildings are erected or when changes are made?

How is storm-water disposed of?

Give size, location and construction of present cesspool, and how emptied.

How are ashes, garbage, etc., disposed of?

Are there house or outdoor water-closets? If so, how are they constructed, cared for or emptied?

For other questions and suggestions, see the Reports of the State Board of Health.

E. M. HUNT, M.D., *Secretary.*

CIRCULAR XL.

AS TO THE HEALTH OF OPERATIVES.

In the work of examination into various industries, with a view to determining their effect on the health and vigor of those employed in them, and upon their families, there are many points of inquiry which must be left to the judgment of the examiner.

The design of this circular is to suggest the outline of the work proposed, which may be added to as the need of each special industry may seem to demand. Where the inquiry is as to classes instead of any specified department, the usual division is—

I. Cultivators of the soil.
II. Active mechanics abroad.
III. Active mechanics in shops.
IV. Inactive mechanics in shops.
V. Laborers—no special trades.

For inquiry into special occupations, the following points are to be thought of:

I. Occupations deleterious by reason of the inhalation of (*a*) Irritating, (*b*) Poisonous, (*c*) Offensive; (*A*) Vapors and Gases, or (*B*) Dust, or (*C*) by Absorption through the skin.

II. Occupations that involve exposure to—
(*a*) Elevated or variable temperatures.
(*b*) Over-use of certain organs.
(*c*) Constrained positions.
(*d*) Sedentary life.
(*e*) Exposure to accidents.

The following outline will serve as a guide to observation and inquiry:

I. The sanitary condition of the place of labor; its locality, construction, drainage, facilities for light and air, water, heating, fire-escape, and for the removal of all wastage or material injurious to health; its housekeeping in the interest of cleanliness and comfort; modes of preventing or of reducing to a minimum all effluvium nuisances; of preventing dust, or so removing it by fans or sprinkling as to diminish its inhalation; modes of protecting from accident by machinery, or from irritating material used in the occupation; modes of supplying a sufficient amount of fresh air without draught, both in summer and winter; also arrangements for washing, dusting, etc., and sanitary inspection.

II. The sanitary conditions of the persons employed in each department; their general habits as to sleep, cleanliness, tobacco and alcoholic drinks; the kind of food and arrangement of meals; how far some head covering or some overall is used to protect self and clothing from dust; the evidences of good or ill health, as afforded by appearances and by the personal testimony of the person or of friends; the effect of the work on heredity, as also whether those whose parents or grandparents have pursued the same occupation inherited a reduced physical stamina; the amount of time lost by sickness; what complaints are most incident to the work; tables of mortality

showing the actual deaths of those employed, or of those who had left the employment on account of ill health. Give age, sex and cause of death, etc., as in usual certificate.

III. The mode of pursuing the occupation; specifications of its various departments and the evils special to each, and the best methods of protection therefrom, and those actually used; the period or duration of labor; is it night work alone, or conjoined with day work? are both males and females employed? if so, are all arrangements fitted for proper separation? is there piece work? what portion of the work is proper for children, and for those of what age, sex or strength, and how long should they be employed in it? constrained or injurious positions in work; what arrangements for change of position or to economize strength and avoid waste fatigue; the income of various workers, so as to know how far it is a sufficiency without other extra labor or family help; what proportion of the adult workers, either male or female, are married; what the condition of the houses in which workmen live.

Those who inspect or who prepare statements need to be familiar with the employment in its details, and to prepare an outline as introductory to the study of individuals and of the effect of trades, or parts thereof, as shown by the accurate history of persons. The report on Hatting in our second report (page 68) will serve as a specimen. Inquiries may be addressed to

E. M. HUNT, M.D., *Secretary.*

CIRCULAR XLI.

(INDUSTRIAL CIRCULAR NO. 2.)

HEALTH COUNSELS FOR WORKING PEOPLE.

HEALTH, CHARACTER, INDUSTRY AND SKILL

Are the capital on which most must rely for support and happiness. Of these not the least is health. Whether or not we are able to do the work we attempt, largely depends upon whether we provide all needful force-producing, repairing and protective materials and methods for operating this personal machinery we call the body. All those who depend upon labor for support have to inform themselves as to the conditions of health, and the evils which they are especially to avoid.

THE BODY, TO BE HEALTHY, MUST BE KEPT CLEAN.

This means, the washing of the body all over, each week, or oftener, with cool or warm water. No cleansing of face or neck or hair or hands will take the place of this. Many who *mean to be clean, but are not*, neglect this In many industries there is a soiling of the body not perceptible, which stops up the pores, and, besides, the natural secretions of the skin need this mode of removal. Neglect of the hair, the ears and the feet often leaves noxious materials about them. The thorough cleansing of the mouth, the nose and the throat, by washing and rinsing, at least three times a day, is especially important to working people who are so much exposed to dust.

The teeth need good care and brushing, because their preservation is so important for good chewing and digestion.

The body, to be kept healthy, must have proper rest. This means, sleep, in a bed and in a room which have been well aired, which are not damp or so cold as to disturb sleep, and for seven or eight hours. It also means relief from fatigue by change of posture. A noon rest, in horizontal position, is often refreshing. Many kinds of work permit a change of position which rests muscles or parts of the body even while the work continues. Workmen do not always *rest* all they can. How to accomplish the most with the least toil is a study for each one. All work is not exercise in its full sense. If not, the change to moderate open air recreation is important. Exercise those muscles which are the least used in your work. Think what your own particular employment demands, and seek to adjust yourself thereto.

THE BODY MUST BE RIGHTLY FED.

Food and force have relations much better understood than formerly. Foods may be spoken of under two great divisions—such as make body or muscle and such as make heat. Most foods contain materials for each. Heat is mostly derived from fats, from foods having starch in them, as bread, potatoes, rice, etc., and from sugars, which are contained in fruits, vegetables, etc. In digestion, the starches are converted into sugar, and thus about equally aid in producing warmth. The heat-producing power of fat in its natural state is over two and a half times as great as that of starch or sugar. The need of the body for food varies, but a relative idea is given of each. During *idleness* the usual requirement is (*a*) Flesh-producing food, 2.73 ounces. Heat-producing food, 20.60 ounces. (*b*) During regular *work*: Flesh-producing food, 4.48 ounces. Heat-producing food, 26.44 ounces.

Bread, meat, potatoes and milk are valuable foods, because they combine these different kinds of food.

Beans, with pork added to furnish fat, very nearly represent meat.

Indian meal has much of the strength of meat, and is rich in oil. It is a nutritious and economical food. It requires long boiling and to be carefully stirred into the water while being prepared. When fried in slices it makes a hearty food.

Of breadstuffs, wheat bread is the best, if it is rightly made of good flour. Heavy bread, because of its difficult digestion, is bad. Warm, light biscuit, well baked and well chewed, are not indigestible. Brown bread is generally made of bran and inferior grades in flour. Many foods disagree, because they are too rapidly eaten. Hurry in eating must be avoided.

MEATS.—Of these, beef and mutton are the most valued foods. Good veal and good pork, if well cooked and properly chewed, so that the fibers get into the stomach in a cut condition, digest quite readily. Tough fiber of any kind of meat needs to be made tender by keeping or pounding, or to be finely divided by chopping. Soup is a very valuable kind of food, and should be oftener used by laborers as the beginning of a meal.

FISH, as compared with butchers' meat, has about half as much of flesh-forming material. Most kinds lack in oil, but it is a nutritious food.

EGGS AND MILK do not need to be enforced as good foods. Cheese, if made of milk, is good as an addition to a usual meal.

VEGETABLES.—Potatoes are of very different quality. They are so much a dependence that more care should be taken in their selection and cooking, so that when cooked they may not cut like soap.

The tomato—half fruit, half vegetable—is very valuable to the laborer, because it cheaply supplies a juice much like that of some fruits which are more expensive. Cabbage, parsnips, carrots and onions rank high among vegetables as nutrients. Turnips are a relish to some, but not so nutritious. The onion contains 4.5 per cent. of carbon, 0.22 of nitrogen, and its oil stimulates digestion. Parsnips, carrots and beets have much sugar in their juices. All these are most digestible when cooked without grease, and properly oiled or seasoned afterward. As all artificial sugars are expensive, we get them best through our foods. As children convert the starches into sugars less rapidly, they need more molasses or other sweets with food than do adults.

DRINKS.—So far as nutriment is concerned, milk has the preference. Skimmed milk only lacks cream, which is supplied by other oils eaten. Buttermilk, by its acid, often aids digestion. Warm drinks aid digestion independently of their composition. Whatever is palatable and harmless may be added.

Tea is slightly refreshing, but not so valuable as coffee. This is not only invigorating, but the hot infusion is equally serviceable against cold and heat; in the one case the warmth, and in the other the action on the skin, are useful, while the nervous stimulation is desirable.

A warm drink at dinner is often valuable for those who carry a cold dinner with them, and is provided in some factories.

We need not discuss the alcoholic beverages as related to labor. The alcohol in them has no nutritious power, and their stimulus or exhilaration is not needed in healthful life. The matter of cost, as compared with any of the other foods or drinks, shows them to be too expensive to be included in any dietary for the laboring classes. This is conceded even by those who would advocate their use in times of extreme fatigue akin to disease. Beer, as used by the working classes in some localities, is a cutting down of daily wages as real as if a reduction was made by employers, and is not necessary.

The use of TOBACCO is so common that we only speak of its mode of use. It is best after meals. Constant smoking or chewing, when at work, injures many. Irregular heart action, nervousness and imperfect digestion often result. The pipe, when coated with the oil of the tobacco, is itself an evil. Each workman should guard against excessive use of tobacco. Young men and boys should not use it, and those who are older and have not the habit, have no need to acquire it.

As working people suffer much from adulteration of tea, coffee, tobacco, spices, baking powders, cheese and from other inferior foods, all factory cities should have analysts to test such frauds.

All simple, nutritious well cooked foods should be at the command of those who work, and none should so certainly get the worth of their money, and not waste money on inferior foods. The families of all workmen need to know of the various forms of foods furnished, and to acquire skill in their proper preparation. This home work, done by those who keep the house and provide the supplies, is a part of skillful labor.

COOKERY.—Health depends so much on good cooking that all house and home-keepers should make of it a study. The chief design of cooking is to make foods tender,

or, in some cases, more palatable. "There are but few foods which require to be cooked in boiling water." A heat not over 180 degrees, instead of 212 or the boiling point, is usually enough for meat, milk, eggs and soup. The reason is that the albumen which these contain coagulates at this temperature, as we see it in the white of a cooked egg, and is made hard and less digestible if the heat is that of the boiling point. The cook easily knows when water is boiling, and by custom can regulate this. Vegetables require more heat, although some of these, when just done, are made more tender by steaming or simmering. Meat for boiling is sometimes dropped into boiling water in order to coagulate the surface and retain the juices, and then the temperature reduced by adding water and boiling at a lesser heat. Meat, which is warmed up, as in stews, should never come to a boil. When possible, bones should be removed from meat before roasting, and kept for soups.

Bread requires an even temperature in baking. If it is at all doughy, it is not so easily digested. Yeast and the better kinds of baking powders enable us to have it good, which is very important to all classes.

TIMES OF EATING.—As food is a relative thing, dependent on the demands made upon us, the quality of food and the times of taking it vary somewhat. While regular hours for eating are desirable, and habits of eating without indication undesirable, yet a piecemeal, when there is over-fatigue or when the former meal has been light, is often advantageous. Nuts, cakes, candies and fruits, as a rule, are not useful when the stomach is empty and needs refreshment. At such times light bread or eggs or soup is better, while the former may be taken at or soon after meals. Those at work in preparing foods often suffer from too frequent eating. Labor, sleep, food, all need to be adjusted to each other, and those who observe are apt to find out how to proportion them.

CLOTHING.—Flannel is so valuable to working people, because it is an equalizer between the heat of the body and its surroundings. If it becomes very compact by pressure or long wear, or is soiled, it loses much of its value. Under-clothing of any kind should not be worn too long, as it and the skin are the great means of cleanliness, and so must be kept clean. The blouse and overalls are of great value as a protection to clothing, and should be adopted in most factories. It has been shown that very compact fiber, or that which becomes pressed or greasy by use, is not as warm as that which is looser and frequently aired and cleansed. No part of the clothing should be worn too tightly. Waistbands and suspenders should be elastic. Much harm is done by garters to those who are much on their feet.

Dress serves to protect the breast more than the back. We forget that the lungs are equally near each. The workman's vest should be as thick on the back as the front. In winter or changeable weather a strip of narrow smooth flannel inside the neck-band of the outer shirt is a protection, better than large woolen mufflers about the throat. In changing from hot, close factories to the outer air a closed mouth and covered shoulders protect from many a cold. All workmen who stand or sit at work need especial care as to dryness of feet. If caps are worn at work, they should always be of light and airy material. Not only is the right temperature of the whole body a matter of comfort, but it is related to vital force, to capacity for work and to the demand for food. We crave fats and hearty food more in cold weather, because we consume more heat. While we regulate the supply by internal means, we must also, by artificial protection and adjustment, regulate our demands, and through these have our needs met. Dust, over-heat and imperfect ventilation are the great perils of indoor labor.

As rest and recreation, and even change of activity, refresh and interrupt the wearing routine of daily toil, they are to be provided for. Only they must be such as do not, by any excess of food or drink, of exposure or of fatigue, limit the value of the change.

American workmen have some great advantages for healthy living, and need to study how to avail themselves of those they have, and how to secure such others as they ought to have. It is a common interest of the State, that health, character, industry and skill, which are the four corner-stones on which prosperity is builded, should be secured; that there should be adequate provision for them, and that those who desire and need them should, for themselves, study and practice the conditions and methods most likely to secure them. Therefore, a personal *forethought* and oversight as to the necessary conditions of health, in *yourself*, in your workshop, in your occupation, in your home and for your family, is urged upon your attention.

CIRCULAR XLII.

AS TO PETROLEUM, KEROSENE, ETC.

The law of this State as to the use of illuminating oils, has done much to exclude from the market inferior grades of oil. This Board is now able to secure the co-operation of the wholesale dealers of the State, and with the aid of Local Boards of Health, can protect the people from explosive oils. The last Legislature, by the act, chapter XCVII., laws of 1883, so changed the law as to use only the flash test. Section one is as follows:

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That hereafter, petroleum, or any of the products thereof, may only be sold for use within this State under the following regulations and restrictions, namely, (*a*) benzole, gasoline, naphtha and benzine must be sold under their true names respectively, and such names must be plainly shown upon the barrel, can or vessel in which the same are sold, or offered or exposed for sale, respectively, or upon a label securely fastened thereto; (*b*) petroleum or kerosene which will flash at a less temperature than one hundred degrees Fahrenheit, flash test, must have plainly designated upon the barrel, can, or vessel in which the same is sold, or offered or exposed for sale, or on a label securely fastened thereto, the number of degrees Fahrenheit, flash test, below which the same will not flash; (*c*) only such product of petroleum as will not flash at a less temperature or flash test than one hundred degrees Fahrenheit may be sold for lighting or illuminating purposes, except where the same is to be used in street lamps or open air receptacles, or in gas machines, in which case (as to petroleum or kerosene) there shall be plainly marked on the barrel, can or vessel in which the same is sold, or offered or exposed for sale, or on a label securely fastened thereto, the words, "not for inside light;" *provided*, that this act shall not apply to petroleum or its products sold in tanks used for transportation.

This law takes effect July 4th, 1883.

See also penalty as follows, sec. 2, 1832:

2. *And be enacted*, That if any person shall sell, or offer or expose for sale, for use within this State, except in the manner permitted by this act, any petroleum or product thereof, he shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not exceeding five hundred dollars, or imprison-

ment at hard labor or otherwise for a term not exceeding one year, or both; and any sale in quantity less than one barrel shall be presumed to be for use within this State.

As the work of testing can be done better by using a closed tester, we have adopted the same oil tester that is approved by the New York Board: Eimer & Amend, 201 Third Avenue, New York City. The following rules are adopted to govern the use of the tester:

Remove the oil cup and fill the water-bath with cold water up to the mark on the inside. Replace the oil cup and pour in enough oil to fill it to within one-eighth of an inch of the flange joining the cup and the vapor-chamber above. Care must be taken that the oil does not flow over the flange. Remove all air bubbles with a piece of dry paper. Place the glass cover on the oil cup, and so adjust the thermometer that its bulb shall be just covered by the oil.

If an alcohol lamp is employed for heating the water-bath, the wick should be carefully trimmed and adjusted to a small flame. A small Bunsen burner may be used in place of the lamp. The rate of heating should be about two degrees per minute, and in no case exceed three degrees.

As a flash torch, a small gas jet ¼ inch in length, should be employed. When gas is not at hand employ a piece of waxed linen twine. The flame in this case, however, should be small.

When the temperature of the oil has reached 85° F., the testing should commence. To this end insert the torch into the opening in the cover, passing it in at such an angle as to well clear the cover, and to a distance about half way between the oil and the cover. The motion should be steady and uniform, rapid and without any pause. This should be repeated at every two degrees rise of the thermometer until the temperature has reached 95°, when the lamp should be removed and the testing should be made for each degree of temperature until 100° is reached. After this the lamp may be replaced if necessary, and the testings continued for each two degrees.

The appearance of a slight bluish flame shows that the flashing point has been reached.

In every case note the temperature of the oil before introducing the torch. The flame of the torch must not come in contact with the oil.

The water-bath should be filled with cold water for each separate test, and the oil from a previous test carefully wiped from the oil cup.

Not less than one pint of the oil to be tested should be sent to the examiner. It must be accompanied by the name of the person sending it and by the name of the person from whom it was obtained, both of which, if necessary, are confidential. Expressage must be prepaid.

Local Boards are urged to collect samples in their districts, and to impress on all buyers and sellers the importance of this protection from dangerous or hazardous oils. Samples sent by Local Boards will be examined without charge.

For convenience the State is divided into sections.

Testing for Bergen, Morris, Passaic, Sussex and Warren counties will be done by Wm. K. Newton, M. D., of Paterson; for Essex, Hudson, Middlesex and Union counties by Prof. A. R Leeds, of Hoboken; for Hunterdon, Somerset, Mercer, Monmouth and Ocean counties by Prof. H. B. Cornwall, of Princeton, and for Atlantic, Burlington, Camden, Gloucester, Cape May, Cumberland and Salem counties by Shippen Wallace, of Burlington.

In the second report of the Board of Health (1878), pages 16–22, and the fourth report (1880), pages 25–28, and the fifth report, pages 22 and 106, the need of legislation upon the subject is illustrated. These are but items in the records of destruction of human life which has occurred from a substance which is safe and valuable for lighting purposes, if properly prepared. Fire and destruction of property often result from use of kerosene. The law which has been passed is the extreme limit of leniency,

and its value depends on its rigid enforcement. We shall have the co-operation of many of the manufacturers, and only need the aid of Local Health Boards and retail dealers to make it fully operative.

It will be the duty of all Local Boards of Health to see to it that the people in their respective districts are protected in the manner and to the degree which the law provides. Besides the notice given by the State Board of Health and in the newspapers, it will be wise for Local Boards to send copies of this circular, which can be had on application by postal to us, to all venders of or dealers in illuminating oil in their respective districts.

All dealers are held responsible that the oil which they are selling for household illuminating purposes is proper for use by the test and method of testing herewith adopted. Any person who can prove that he has bought oil of a less grade "for inside light" may bring suit. Purchasers of oils to be sold in this State should have the guaranty that the oils purchased are such as will answer the test herein given, and should not, when purchasing from refiners outside the State, rely upon the brand, but ask the written guaranty of the dealer.

In case of any accident occurring from the *actual explosion* of any lamp or can containing oil, the Local Board of Health should at once procure specimen and evidence as to its source and have the same tested by one of the analysts. Even where accident has resulted from the improper use of oil, as in lighting fires, the rapid explosion often results from gas present in the can or the intense inflammability of the oil.

All cities should employ a local inspector, who, if need be, can be duly authenticated by this Board. Besides the oversight of Local Boards we shall use proper methods for discovering the qualities of kerosene offered in the market and the sources from which it comes. It is to the interest of all that a safe kerosene be used. Heretofore, the production of a poor article has made an unfair competition, which it is hoped to overcome since life and health are endangered and fair dealing is prejudiced thereby.

It will be well for all retail dealers, in purchasing at wholesale, to have their bills certify that the oil purchased is up to the grade now required by the laws of New York and New Jersey.

E. M. HUNT, *Secretary*.

CIRCULAR XLIII.

Inclosed herewith please find an outline for the Annual Report for the year ending October 1st, 1883. Under the schedule of subjects for Report, in the case of cities and townships enumerated in the 6th Report (1882), pages 151–154, it will not be necessary to repeat as to *A*, *B*, *E*, *G*, *I*, *O*, as most of the facts are on file.

Under *A*, in the case of all cities or incorporated towns, it is desirable to report the number of acres included in the incorporation.

C. State exact source of water-supply. If a public supply, is it by the city or a private company? How many houses take it? Is the water ever discolored? Has it an iron or other taste? Is it hard or soft? Is it bad at any one season of the year? Are reservoirs or water pipes cleansed? Does the source or stream from which it is taken receive any sewage above the point of supply? Any other facts as to source, quantity or quality. How many depend on wells? How many on cisterns?

D. As to drainage, state whether any system of drainage for the ground is used as

distinct from sewerage. Is the usual water level such as to secure dry cellars? If there are swamps near you, or malaria is frequent, give particulars.

As to *sewers*, state their construction, their grade or fall per 100 feet, their size, their outfall, their flushing and ventilation, and whole length.

F. State whether houses generally have basements or cellars. If a city, whether the basements are occupied; if country, whether largely used for storage of vegetables. How many tenement houses of more than two families?

H. State how far sewers are used. If cesspools, state whether they are cemented, or whether built with open bottom and sides. How are they emptied?

J. State any known or prevalent diseases. Does assessor inquire each year as to losses of animals and contagious diseases? If a city, is there a register of all persons keeping horses, cows, hogs, etc.

K. Are slaughter houses inspected so as not to be a nuisance to neighbors?

L. State any new manufactories, and any evil to health therefrom.

Look carefully at each heading and state what you know.

Do not put down a disease a prevalent unless you have personally known of at least ten cases. Often the physician of the Board should make out or aid in the report; add such suggestions as occur to him; but between yourself and him let there be no delay to make return during October. We must trust chiefly to the assessor and the physician to keep the other members of the Board acquainted with health condition, and with the rights and duties of the Board. Any neglects reported to us will be inquired into. Refer to Circular XXXIX., before sent you, for further suggestions. We send also this month list of physicians that you may cross off any deceased or removed, or who have left practice. Add all new ones who have *settled* for practice in your city or township. Give name and *post office address*, etc., *plainly*, and only those who are practitioners and who *reside* within the limits you represent. Mail all to us, in envelope herewith sent, by November 1st.

E. M. HUNT, *Secretary.*

NOTE.—All these and other Circulars can be had in large print on application by postal.

References to Health Laws and Circulars will be found on pp. 31–34 of this Report and pp. 253–260 of 6th Report.

MEDICAL REGISTRY.

This list of physicians living and practicing in the State of New Jersey, is furnished in accord with section 2, of a supplement to an act entitled "An act to regulate the practice of medicine and surgery," approved March 12th, 1881, said supplement having been passed March 22d, 1883:

2. *And be it enacted*, That in order to secure to the State Board of Health a full record of all physicians and surgeons who, under the laws of this State, are required to give certificates of death, it shall be the duty of the county clerk of each county of the State, to furnish to the State Board of Health, a list of the names of all physicians and surgeons who have deposited with him copies of their diplomas, together with the date of their respective diplomas, and the name and place of the institution purporting to confer such diploma, and each county clerk shall yearly furnish to the State Board of Health a similar list of those physicians and surgeons hereafter depositing diplomas with him, and shall include in such list also the names of those physicians and surgeons filing affidavits with him, as mentioned in the second section of this act; and each county clerk shall keep in a suitable book, an index of the names of all physicians and surgeons depositing diplomas or filing affidavits in pursuance of this act or the acts to which this is a supplement; and for every name indexed and furnished to the State Board of Health as hereinbefore provided, the county clerk so indexing and furnishing such name, shall be entitled to receive from the State Board of Health, through its secretary, the sum of six cents.

In addition to the usual information as to laws passed, the Board has sought to acquaint each practitioner in the State with the law. Some had, under a law previous to 1880, filed their diplomas, but as no index had been kept, there was no means of securing a registry except by a refile of all former diplomas, and a filing of all new ones. As the law of 1880 makes no exception as to those who had diplomas on file beforehand, and a subsequent supplement speaks not only of those that commence, but of those who continue to practice without

conforming to the law of 1880, and always says, "shall" file and not "shall have" filed, medical men have, as a rule, so understood it; about 1,800 have filed under the law.

If any physician having a diploma from any chartered medical college, has, by ignorance of the law, failed to record, or if any one having filed a diploma under any former law, has failed to conform to the law of 1880, and the supplements thereto, the oversight should be immediately remedied. The law does not seek to discriminate between practitioners of different sects, or to assume that all who have filed diplomas are competent, but it does assume that any person who offers services requiring education and skill by announcing himself as a physician, shall have such form of attestation as this law provides. While it is the mildest form of restraint upon irregular practice which so often endangers the lives and health of citizens, it warns both those who attempt charlatanry and the people against the penalties and risks involved. We give the lists as furnished by the county clerks, in the order of the counties, and in the order of the names, which are not always alphabetically arranged.

ATLANTIC COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Stille, Samuel	Egg Harbor City	Mar. 12, '75	University of Penna., Phila.
Boysen, Theophilus H	Egg Harbor City	Feb. 24, '74	University of Buffalo, N. Y.
Ingersoll, Denman Bevis	Mays Landing	Mar. 11, '65	University of Penna., Phila.
North, Joseph H	Hammonton	Sept. 2, '35	University of Bowdoin, Me.
Martin, Richard Allen	Atlantic City	Mar. 12, '79	University of Penna., Phila.
Kirkpatrick, Alexander		Mar. —, '61	University of Penna., Phila.
Wright, Willard	Atlantic City	Mar. 14, '67	University of Penna., Phila.
Crosby, Obed. H	Atlantic City	Mar. 5, '74	Hahneman College, Phila.
Somers, Job Braddock	Linwood	Mar. 15, '59	Jefferson College, Phila., Pa.
Abbott, Griffith E	Tuckahoe	Mar. 14, '79	University of Penna., Phila.
Waters, Talcott P	Absecon	Mar. 13, '69	University of Penna., Phila.
Souder, Charles	Atlantic City	July 10, '52	College of Medicine, Phila.
Harris, George M	Port Republic	Feb. 19, '75	College of Medicine, Phila.
Edmonds, Samuel C	Linwood	Mar. 8, '51	Jefferson College, Phila., Pa.
Brown, Louisa (midwife)	Hammonton	Feb. 8, '78	University of Penna., Phila.
Reed, Thomas K	Atlantic City	Mar. 12, '64	University of Penna., Phila.
Reed, William Boardman	Atlantic City	Mar. 15, '78	University of Penna., Phila.
North, James	Atlantic City	Mar. 13, '80	Jefferson College, Phila., Pa.
Nivison, Oziel	Hammonton	Mar. 1, '77	Eclectic Med. College, N. Y.
Armstrong, L. H	Atlantic City	Mar. 13, '71	Jefferson Med. College, Phila.
Hunter, David	Atlantic City	Mar. 12, '78	Jefferson College, Phila., Pa.
Youngman, Maurice D	Atlantic City	Mar. 5, '80	Hahneman College, Phila.
Jessop, Samuel A. S	Atlantic City	Mar. 12, '79	Jefferson College, Phila., Pa.
Hyde, Anna M. (midwife)	Hammonton	Feb. 14, '78	University of Penna., Phila.
Hallowell, Rebecca C	Atlantic City	Mar. 14, '78	Woman's Med. College, Phila.

ATLANTIC COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Cary, John E	Lower Bank	Sept. 16, '62	Columbia College, New York.
Fleming, John R	Absecon	Mar. 14, '82	Hahneman College, Phila.
Bennett, Henry Hudson	Atlantic City	May 13, '81	Columbia College, New York.
Wootton, William	Atlantic City	Mar. 14, '82	Hahneman College, Phila.
Neff, Joseph S	Atlantic City	Mar. 11, '75	Jefferson College, Phila., Pa.
Bennett, William H	Atlantic City	Mar. 13, '69	University of Penna., Phila.
Kollock, Matthew H	Atlantic City		Affidavit—20 years' practice.
Murray, James Munro	Atlantic City	Mar. 10, '76	University of Penna., Phila.
Stewart, Henry Knox	Atlantic City	Feb. 27, '69	Hahneman College, Phila.
Bartine, David Wesley	Ocean City	Mar. 11, '72	Hahneman College, Phila.
Crosby, George W	Atlantic City	Feb. 28, '78	Homœopathic College, N. Y.
Pollard, William	Atlantic City	Mar. 30, '82	Jefferson College, Phila., Pa.
Purcell, John C	Atlantic City	Mar. 30, '82	Jefferson College, Phila., Pa.
Nichols, Caroline G	Weeksville	Mar. 10, '76	University of Penna., Phila.
North, William McK	Atlantic City	Apr. 2, '83	Jefferson College, Phila., Pa.
Peebles, J. M	Hammonton	Oct. 19, '76	University of Penna., Phila.
Hale, William H	Atlantic City	Mar. 30, '82	Jefferson College, Phila., Pa.
Sheppard, John E	Atlantic City	Mar. 15, '82	University of Penna., Phila.
Reiley, Edward Anderson	Atlantic City	Mar. 8, '81	University of New York.
Backus, Boardman P	Atlantic City	Mar. 6, '81	Eclectic Med. College, N. Y.
Gill, Charles	Mays Landing		Affidavit—40 years' practice.

BERGEN COUNTY.

Ayers, Melancthon S	Fairview	June 2, '71	Long Island Col., Brooklyn.
Badeau, C. W	Ramsey	Mar. 6, '69	University of New York City.
Crary, Henry A	Closter	Jan. 9, '66	Albany Med. College, N. Y.
De Mund, John T	Ridgewood	Mar. 12, '64	University of Penna., Phila.
Francis, William	Ridgewood	Mar. 1, '70	Bellevue College, N. Y. City.
Hunt, Hoit Eben		Mar. 1, '82	Eclectic Med. Col., N. Y. City.
King, Keneth Kirk	Rutherford	Mar. 1, '77	Bellevue College, N. Y. City.
Lowry, Charles	Hackensack	Mar. 3, '63	Homœopathic College, Phila.
Morris, Frederick	Cresskill	Mar. 9, '42	University of New York City.
Neer, Henry C	Park Ridge	Nov. 20, '60	Berkshire Med. Col., Mass.
Parker, George B	Ridgewood	Feb. 20, '47	Buffalo University, N. Y.
Richter, Augustus	Carlstadt	Nov. 14, '62	University Liepsic, Germany.
St. John, David	Hackensack	Mar. 1, '75	Bellevue College, N. Y. City.
Turnure, Milton	Closter	Mar. 11, '78	University of New York City.
Van Dyck, Cornelius C	Ramsey	Mar. 28, '42	Med. Soc. Schoharie Co., N. Y.
Williams, Augustus P	Rutherford	Sept. 11, '60	Columbia College, N. Y. City.
Zimmerman, Edwin	Ramsey	Mar. 1, '79	University of Maryland, Balt.
Burdett, Abraham S	Hackensack	Mar. 4, '52	University of New York City.
Casey, James H	Carlstadt	Mar. 1, '75	Columbia College, N. Y. City.
Demarest, Cornelius L	Arcola	May 1, '79	Bellevue College, N. Y. City.
Flowers, Millard F	Ramsey	Mar. 1, '73	University of Maryland. Balt.
Hopper, Henry A	Hackensack	Mar. 6, '57	Albany University, N. Y.
Luckey, Mrs. Annie		Mar. 1, '65	Med. Col. for Women, N. Y.
McGiffert, William C	Carlstadt	Mar. 13, '81	Columbia College, N. Y. City.
Phelps, Jeremiah W	Rutherford	June 18, '46	Caselton College, Vermont.
Reid, Thomas	Closter	Mar. 15, '76	University of New York City.
Soper, Oliver	Lodi	Mar. —, '78	Eclectic College, N. Y. City.
Taylor, William H. O	Ridgefield	Mar. 8, '81	University of New York City.
Wells, John A		Feb. 8, '79	Columbia College, N. Y. City.
Zabriskie, Simeon J	Westwood	Mar. 9, '61	University of New York City.

BERGEN COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Baldwin, Theodore H.....	Hackensack	Mar. 4, '75	Homœopathic Med. Col., N.Y.
Campbell, George.........	....	Mar. 18, '82	University of New York City.
Hollister, Horace H......	Rutherford..........	June 5, —	Long Island Col., Brooklyn.
Luck, John T	Closter...............	Feb. 8, '68	Columbia College, N. Y. City.
Phillips, Cyrus B..........	....	Mar. 1, '82	University of Maryland, Balt.
Smith, Benjamin F........	Hackensack	Mar. 4, '80	Eclectic Med. Col., N. Y. City.
Zabriskie, Guilliam A....	Ridgewood	Oct. 11, '81	Columbia College, N. Y. City.
Brown, George E..........	Hackensack	Mar. 1, '75	Columbia College, N. Y. City.
Cogswell, William B......	Hackensack.........	Mar. 10, '81	Bellevue College, N. Y. City.
Hüger, Joseph..............	Hackensack.........	Mar. 12, '80	Columbia College, N. Y. City.
Latour, Isidore P..........	Fort Lee............	Mar. 1, '69	Columbia College, N. Y. City.
Stephens, Jacob J.........	Tappantown, N.Y.	Oct. 4, '46	Albany University, N. Y.
Burr, Henry N..............	....	Aug. 25, '63	Albany Med. Society, N. Y.
Clendenen, Alexander....	Fort Lee............	Mar. 7, '59	University of Maryland, Balt.
Hopper, John W...........	Hackensack.........	Feb. 8, '79	Columbia College, N. Y. City.
Baldwin, D. A..............	Englewood	Mar. —, '49	University of New York City.
Currie, Daniel A...........	Englewood	Feb. 9, '64	University of Buffalo, N. Y.
Bogert, Albert O...........	Pearl River, N. Y.	Mar. 1, '75	Columbia College, N. Y. City.
Badger, Merritt O.........	Closter...............	June 9, '81	University of New York City.
Banks, Hardy M...........	Englewood	Mar. 5, '51	University of New York City.

BURLINGTON COUNTY.

Ashurst, Francis...........	Mount Holly.......	Mar. 14, '67	University of Penna., Phila.
Bennett, John P............	Mount Holly.......	Mar. 11, '65	University of Penna., Phila.
Bispham, Charles W......	Mount Holly.......	Mar. 15, '78	University of Penna., Phila.
Barrington, Richard C...	Mount Holly.......	Mar. 30, '82	Jefferson Med. College, Phila.
Brown, John C.............	Vincentown	Mar. 14, '79	University of Penna., Phila.
Bullock, Lawrence M.....	Jacobstown.........	Mar. 12, '81	Jefferson College, Phila, Pa.
Baker, Charles A..........	Florence.............	Mar. 9, '67	Jefferson College, Phila., Pa.
Chamberlain, Wm., Jr.....	Mount Holly.......	Mar. 12, '77	University of Penna, Phila.
Caley, Samuel..............	Mount Holly.	Mar. 11, '76	Hahneman Med. Col., Phila.
Calver, George W. H......	Columbus	Dec. 22, '62	Eclectic Med. College, Phila.
Carey, John E..............	Lower Bank.......	Sept. 16, '62	Columbia College, N. Y. City.
Clark, S. G..................	Tuckerton...........	Mar. —, '68	Med. University, N. Y. City.
Clay, George B. L.........	Moorestown.........	Mar. 1, —	Homœopathic College, Phila.
Currie, Joseph J...........	Columbus...........	Mar. 1, '66	Homœopathic College, Phila.
Cox, Newton C.............	....	Apr. 13, '83	University of Penna., Phila.
Downs, Jesse...............	Marlton.............	Apr. 12, '75	University of Penna, Phila.
Dey, Charles L.............	Crosswicks..........	Feb. 23, '72	Columbia College, N. Y. City.
Duvall, Augustin W......	Beverly	Mar. 10, '77	Jefferson College, Phila, Pa.
Elwell, Alexander.........	Vincentown.........	Apr. 3, '47	University of Penna, Phila.
Febs, Levi Decker.........	Bordentown	Mar. 10, '73	Hahneman Med. Col., Phila.
Frankish, Joseph..........	....	Mar. 13, '80	Jefferson Med. College, Phila.
Frankish, John	....	Mar. 12, '81	Jefferson Med. College, Phila.
Gauntt, Franklin	Burlington..........	Apr. 3, '47	University of Penna., Phila.
Grigg, Jacob................	Pemberton	Mar. 31, '43	University of Penna, Phila.
Goodell, George...........	Sykesville	Mar. 26, '35	University of Penna, Phila.
Hyatt, P. Fernando.......	Bordentown	Mar. 2, '65	(College name not legible).
Hall, G. E...................	Riverton	Mar. 12, '78	Jefferson College, Phila, Pa.
Hollingshead, Enoch......	Pemberton	Mar. 14, '67	University of Penna., Phila.
Haines, Franklin..........	Rancocas...........	Mar. 2, '67	Homœopathic College, Phila.
Hall, Harrison B..........	Riverton	Feb. 27, '69	Homœopathic College, Phila.
Helton, John...............	....	Feb. 22, '60	Eclectic Med. College, Phila.

BURLINGTON COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Jemison, P. L	Bordentown	Mar. 7, '5‹	University of Penna., Phila.
Janney, Joshua L	Cinnaminson	June 30, '65	Starling Med. Col., Col., O.
Longstreet, Henry H	Bordentown	Mar. 29, '42	New York University.
Laning, Elwood S	Burlington	Mar. 22, '49	New York University.
Melcher, William P	Pemberton	Mar. 10, '76	University of Penna., Phila.
Maines, Elias Q	Sykesville	Mar. 1, '27	Columbia College, N. Y. City.
Moore, C. Howard	Julinstown	Apr. 27, '67	Eclectic Med. College, Phila.
Moore, John H	Tuckerton	Mar. 15, '80	University of Penna., Phila.
Martin, William L	Rancocas	Mar. 6, '52	Jefferson College, Phila., Pa.
Marcy, Alexander Jr		Mar. 15, '80	University of Penna., Phila.
McNorth, William K		Apr. 2, '83	Jefferson College, Phila. Pa.
Nichols, Charles G	Green Bank	Apr. 10, '80	University of Penna., Phila.
Parsons, Richard C	Mount Holly	June 15, '80	University of Penna., Phila.
Parry, William C	Mount Holly	Mar. 9, '72	Jefferson College, Phila., Pa.
Patterson, Austin H	Georgetown	Mar. 1, '73	University of New York City.
Pugh, J. Howard	Burlington	Apr. 3, '52	University of Penna., Phila.
Page, Richard H	Columbus	Apr. —, '50	University of Penna., Phila.
Price, Theopilus T	Tuckerton	Mar. 5, '53	Medical College, Phila., Pa.
Parrish, Joseph	Burlington	Apr. 4, '44	University of Penna., Phila.
Pearsall, John C	Riverside	Mar. 30, '82	Jefferson College, Phila., Pa.
Reeve, Josiah	Medford	Mar. 14, '63	University of Penna., Phila.
Reeves, William M	Tuckerton	Mar. 12, '70	Jefferson College, Phila., Pa.
Roberts, James B	Beverly	Mar. 10, '73	Hahneman College, Phila.
Rink, Eugene F	Burlington	Mar. 8, '77	Hahneman College, Phila.
Sharp, Edgar B	Tuckerton	Mar. 9, '76	Hahneman College Phila.
Shaw, Amos G	Jacobstown	Mar. 12, '63	Columbia College, N. Y. City.
Sharp, L. L	Medford	Mar. 12, '64	University of Penna., Phila.
Shipps, William H	Bordentown	Mar. 15, '78	University of Penna., Phila.
Stroud, P. VanBuren	Marlton	Mar. 14, '61	University of Penna., Phila.
Stroud, Joseph C	Moorestown	Mar. 6, '51	Jefferson College, Phila., Pa.
Shreve, Joseph	Burlington	Feb. 21, '66	University of Penna., Phila.
Stokes, N. Newlin	Moorestown	Mar. 14, '61	Jefferson College, Phila., Pa.
Taylor, Addison W	Beverly	Mar. 14, '71	University of Penna., Phila.
Townsend, Ellis P	Beverly	Mar. 10, '63	Jefferson College, Phila., Pa.
Thornton, Samuel C	Moorestown	Apr. 3, '52	University of Penna., Phila.
Towne, Edwin C	Florence	Mar. 12, '73	Jefferson College, Phila., Pa.
Van Rensselaer, ——	Burlington	Mar. 13, '69	University of Penna., Phila.
Van Mater, Daniel G	Columbus	Mar. 1, '75	(College name not legible).
Vandervere, George W	Medford	Mar. 10, '73	Hahneman College, Phila.
Warrington, Joseph	Moorestown	Mar. 27, '28	University of Penna., Phila.
Ward, Walter	Mount Holly	Mar. 6, '40	Jefferson College, Phila., Pa.
Woodruff, William L	Columbus	Mar. 14, '82	Hahneman College, Phila.
Whitehead, John G. L	Bordentown	Feb. 28, '52	Phila. College of Medicine.
Werner, Mariam B		Mar. 10, '80	Phila. College of Medicine.
Whitehead, Willett W	Bordentown	Mar. 10, '81	Hahneman Col. of Medicine.
Wilson, Pusey	Moorestown	Mar. 3, '62	Homœo. College of Medicine.
White, Robert	Beverly	Mar. 15, '80	University of Penna., Phila.
Wheeler, Harry	Delanco	Mar. 13, '83	Hahneman College, Phila.
Young, Irene D	Bordentown	Mar. 7, '48	(College name not legible).
Yeager, Jacob R	Burlington	Apr. 15, '69	Hygei's Thera College, N. Y.
Zeitler, Augustus E	Jacobstown	Mar. 2, '67	Homœopathic College, Phila.

CAMDEN COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Armstrong, James A	Camden		University of Pennsylvania.
Andrews, Purnell W	Camden		Penna. Col. Hom. Medicine.
Ashmead, Albert S	Camden	Mar. 13, '69	Pennsylvania University.
Aldrich, Herbert E			Hahneman College.
Bryant, J. Kemper	Camden	Mar. 1, '56	Penna. Col. Hom. Medicine.
Beall, Philip W	Camden		Jefferson College.
Bartine, David H	Merchantville		Pennsylvania University.
Branin, Henry E	Blackwoodtown		Jefferson College.
Blackwood, Thomas R	Camden		Hahneman College.
Benjamin, Dowling	Camden		Pennsylvania University.
Blake, Duncan W	Gloucester City		Jefferson College.
Boughman, George W			Jefferson College.
Belden, O. S	Camden		Pennsylvania University.
Barber, Isaac A			Hahneman College.
Bethell, John P			Pennsylvania University.
Browning, Walter C			Jefferson College.
Bringhurst, William			Jefferson College.
Bean, Samuel T	Camden	Mar. 30, '82	Jefferson College of Penna.
Barrett, Albert R			Nashville Univ. of Tennessee.
Backus, B. P			(College name not legible).
Bell, Edward H		Mar. 11, '75	Jefferson College.
Cooper, Clark T	Camden	Feb. 18, '68	Hom. Med. Col. of Penna.
Carles, Samuel	Camden		Hom. Med. Col. of Penna.
Clauson, Jacob E			Baltimore College.
Collins, Edwin			Pennsylvania University.
Cox, Henry	Camden		Jefferson College.
Davis, William Albert	Camden		Pennsylvania University.
Davis, H. H	Camden		Jefferson College.
Donges, John W	Camden		Pennsylvania University.
Du Bois, William G			Hahneman College.
Dobson, Augustus T			Pennsylvania University.
Eyre, Frank			Pennsylvania University.
Fortiner, George R	Camden	—— —, '79	University of Pennsylvania.
Fortiner, Ida F	Camden	—— —, '79	University of Pennsylvania.
Fullmer, John J		Jan. 30, '58	Pennsylvania Eclectic Col.
Finlaw, J. Parker		June 16, '79	Kansas Eclectic College.
Finlaw, J. B		May 10, '79	Kansas Eclectic College.
Green, Charles W	Camden	Oct. 24, '67	Dartmouth College.
Gross, Onan B	Camden		University of Pennsylvania.
Godfrey, E. L. B	Camden		Jefferson College.
Griffith, Anna E			(College name not legible).
Gardner, Richard			Hahneman College.
Gardiner, Thomas U. W			Hahneman College.
Gassaway, James M			Columbia College.
Gunter, Guilford H			Pennsylvania University.
Howard, E. Melville	Camden		Hahneman College.
Hugg, Isaac N	Camden	Feb. 23, '69	University of Pennsylvania.
Hamilton, William A	Camden		Baltimore College.
Hatton, Louis			Pennsylvania University.
Hunt, W. H	Camden		Massachusetts Academy.
Hunt, H. F	Camden		Providence College.
Haney, J. R	Camden		Pennsylvania University.
Hurff, Joseph E			Jefferson College.
Hudders, C			Jefferson College.
Hoell, Conrad G	Camden		Pennsylvania University.
Hickman, G. H			Jefferson College.

CAMDEN COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Halton, John	Camden		Pennsylvania Electrial Col.
Irwin, Samuel B	Camden		Jefferson College.
Iszard, William H	Camden		Jefferson College.
Ireland, William H	Camden		Pennsylvania University.
Jennings, Napoleon B	Haddonfield		Jefferson College.
Johnston, Samuel H			(College name not legible).
Jones, J. H			New York University.
Jennings, James		Sept. 12, '40	Medical College, New York.
Kennedy, Samuel		Mar. 9, '70	Hahneman College.
Kitchen, George H		June 6, '70	Pennsylvania Electrial Col.
Leahy, Michael Morgan		Sept. 10, '60	University of Glasgow.
Leckner, John Davis	Camden		Hahneman College.
Mecray, Alexander M	Camden	Oct. 12, '65	University of Pennsylvania.
Mulford, Isaac B	Camden		University of Pennsylvania.
Middleton, M. F	Camden		Hahneman College.
Morgan, Randal W	Camden		University of Pennsylvania.
Otway, David B			Jefferson College.
Pancoast, D. Parrish	Camden		University of Pennsylvania.
Presley, Sophia		——, '79	Pennsylvania College.
Pfeiffer, G. S. F	Camden		Penna. Homœopathic Col.
Pratt, Lyndom M	Camden		Pennsylvania University.
Palm, Howard F	Camden		Jefferson College.
Peacock, Robert H			Hahneman College.
Pfeiffer, Frederick P	Camden		Philadelphia University.
Quint, Silas H	Camden		Hahneman College.
Rowand, Thomas G	Camden		University of Pennsylvania.
Ridge, James M	Camden		University of Pennsylvania.
Rosenstein, Simon			University of Pennsylvania.
Richards, Jennie			University of Pennsylvania.
Robinson, George Taylor	Camden		University of Pennsylvania.
Sheets, John A. J		Mar. 15, '80	University of Pennsylvania.
Stout, Daniel M			Jefferson College.
Shivers, C. Hendry			Jefferson College.
Shivers, Bowman H	Haddonfield		University of Pennsylvania.
Schellinger, Clarence M	Camden		Jefferson College.
Schenck, J. V	Camden		University of Pennsylvania.
Sharp, Edgar B			Hahneman College.
Smith, Henry A. M			Jefferson College.
Snowden, John W			University of Pennsylvania.
Smitcher, Elijah J	Camden		Chicago University.
Simon, Samuel H			Hahneman College.
Strock, Daniel			Jefferson College.
Smiley, E. R	Camden	Mar. 12, '81	Jefferson College.
Stanton, James G	Camden		Jefferson College.
Stanton, James H	Camden		University of Pennsylvania.
Stevenson, J. R			University of Pennsylvania.
Sutton, John W			Columbia College.
Taylor, H. Genet	Camden	Mar. 15, '60	University of Pennsylvania.
Tomlinson, Edwin	Gloucester City		Jefferson College.
Taylor, R. G			Jefferson College.
Tullis, Eli	Camden		Hahneman College.
Wroth, James H	Camden		University of Pennsylvania.
Wamsley, James A	Camden		Jefferson College.
Williams, Theodore S			Penna. Col. Hom. Medicine.
Walsh, Francis	Camden		University of Pennsylvania.
White, J. Orlando	Camden		University of Pennsylvania.

CAMDEN COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Williams, Franklin E....	....	....	Hahneman College.
Woolston, E. B............	....	....	University of Pennsylvania.
Waggoner, John S........	....	....	University of Pennsylvania.
Waters, Talcott P..........	....	....	University of Pennsylvania.
Wescott, William A.......	....	Apr. 2, '83	Jefferson College.
Warnock, William.........	Camden..............	Mar. 15, '80	University of Pennsylvania.

CAPE MAY COUNTY.

Abbott, Benjamin T......	Tuckahoe...........	(In Latin)..	Jefferson College, Phila., Pa.
Bartine, David W.........	....	(In Latin)..	Hahneman Med. Col., Phila.
Carll, George G............	Dennisville.........	Mar. 13, '62	University of Penna., Phila.
Downs, Isaac M...........	Cape May C. H....	May 16, '64	Phila. Eclectic Medical Col.
Davidson, David..........	....	(In Latin)..	University of Pennsylvania.
Downs, Isaac M...........	Cape May C. H....	(In Latin)..	Jefferson College, Phila. Pa.
Gandy, Charles M.........	....	Mar. 12, '79	Jefferson Med. College, Phila.
Hedstrom, William F.....	....	Mar. 1, '74	Hahneman Med. Col., St. Louis
Hand, John Holmes......	Cape May C. H....	Mar. 24, '70	Eclectic Med. Col. of Penna.
Humphreys, Edward......	South Seaville.....	(In Latin)..	Hahneman Med. Col., Phila.
Ingram, Jacob H...........	....	(In Latin)..	University of Penna., Phila.
Kemble, James.............	....	(In Latin).	Hahneman Med. Col., Phila.
Kennedy, Henry A.......	Cape May City....	Mar. 13, '68	University of Penna., Phila.
Leaming, Walter S........	Cape May C. H....	Feb. 26, '76	Pa. Col. Dental Sur., Phila
Leaming, Jonathan F.....	Cape May C. H....	Mar. 24, '46	Jefferson College, Phila., Pa.
Leaming, Jonathan F.....	Cape May C. H....	Mar. 1, '67	Penna. College Dental Sur.
Leaming, Walter S........	Cape May C. H....	Mar. 30, '82	Jefferson College, Phila., Pa.
Marcy, Milton Sumner...	....	Mar. 5, '78	Chicago Medical College, Ill.
Mecray, James Jr..........	Cape May City....	Mar. 12, '65	University of Penna., Phila.
Marcy, Virgil M. D........	Cape May City....	Mar. 10, '47	University of Maryland, Balt.
Marshall, Randolph.......	Tuckahoe...........	Mar. 10, '77	Jefferson College, Phila., Pa.
Marshall, Joseph C........	Tuckahoe...........	Mar. 11, '70	University of Penna., Phila.
Phillips, E. H...............	Cape May City....	Mar. 4, '68	Hahneman Med. Col., Phila.
Rosenstein, Simon.........	....	May 16, '71	Phila. Univ. Med. and Sur.
Swain, Humphrey.........	Goshen..............	(In Latin)..	University of Penna., Phila.
Slaughter, James M.......	Rio Grande.........	(In Latin)..	Maryland Academy, Balt.
Way, Eugene...............	Dennisville.........	Mar. 12, '79	Jefferson Med. College, Phila.
Way, Palmer M............	Seaville.............	Jan. 27, '52	Albany Med. College, N. Y.
Wheaton, Theodore C.....	Millville.............	Mar. 14, '79	University of Penna., Phila.
Wiley, John.................	Cape May C. H....	Mar. 11, '37	Jefferson Med. College, Phila.
Waggoner, John S.........	....	(In Latin)..	University of Penna.
Wheaton, Joseph C........	South Seaville......	Apr. 2, '83	Jefferson Med. College, Phila.
Young, Alexander.........	Cape May City....	Sept. 19, '59	Jefferson Med. College, Phila.

CUMBERLAND COUNTY.

Appelgate, William S.....	Fairton..............	Apr. 2, '83	Jefferson College, Phila.
Bateman, Ephraim........	Cedarville..........	July 4, '51	New Jersey Medical Society.
Bateman, Eli E.............	Cedarville..........	July 6, '32	New Jersey Medical Society
Holton, John................	Bridgeton...........	Jan. 22, '60	Eclectic Med. College, Phila.
Newell, William L.........	Millville.............	Mar. 15, '59	Jefferson College, Phila.
Smith, H. Clay.............	Millville.............	Mar. 14, '66	University of Penna., Phila.
Wiley, Charles.............	Vineland............	Mar. 10, '64	Jefferson College, Phila.

CUMBERLAND COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Wade, John W., Jr		Jan. 1, '76	Phila. Univ. Med. and Sur.*
Baker, Caroline A		Mar. 9, '67	Jefferson College, Phila.
Backus, Boardman P		Mar. 6, '81	Eclectic Med. College, N. Y.
Bennett, Jacob E	Millville	Mar. 12, '81	Jefferson College, Phila.
Bateman, Elliston R	Cedarville	Mar. 15, '82	University of Penna., Phila.
Bacon, Stetson L	Port Norris	Mar. 9, '58	Jefferson College, Phila.
Bowen, John B	Bridgeton	Mar. 14, '61	University of Penna., Phila.
Butcher, Joseph	Mauricetown	Apr. 2, '83	Jefferson College, Phila.
Conover, James V		June 1, '80	Eclectic Med. Col., Cin., O.
Dare, Charles H	Shiloh	Mar. 10, '70	University of Penna., Phila.
Decker, Corbin J		Mar. 13, '70	Jefferson College, Phila.
Elmer, Robert W	Bridgeton	Apr. 5, '60	Med. Society of New Jersey.
Ewing, Robert P	Greenwich	Mar. 13, '68	University of Penna., Phila.
Elmer, William	Bridgeton	Sept. 6, '48	Med Society of New Jersey.
Elmer, Henry W	Bridgeton	Mar. 13, '69	University of Penna, Phila.
Fleming, John R		Mar. 14, '82	Hahneman College, Phila.
Fithian, Henry C	Port Norris	Mar. 12, '77	University of Penna., Phila.
Farr, Eleazer D	Cedarville	Jan. 20, '58	Eclectic Med. Col., Phila.
Foote, Theodore	Vineland	Mar. 5, '74	Hom. Med. College of N. Y.
Glanden, Andrew P	Newport	Mar. 10, '65	Jefferson College, Phila.
Holmes, Ephraim	Greenwich	Apr. 4, '44	University of Penna., Phila.
Hill, Charles T	Dividing Creek	Mar. 18, '81	Penna Med. College, Phila.
Hyde, Anna M		Feb. 14, '78	Phila. Univ. Med. and Sur.
Haley, George P	Newport	Mar. 12, '79	Jefferson College, Phila.
Harris, George A	Bridgeton	Dec. 20, '72	American University, Phila.
Ingram, John	Vineland	Feb. 25, '80	Sterling Med. College, Col., O.
Jones, William S	Millville	Mar. 12, '78	Jefferson College, Phila
Jennings, James		Sept. 12, '40	Reformed Med. Soc of N. Y.
Lucas, Mary		June 28, '53	Beach's Refor'd M. Col, Mass.
Lane, Franklin	Vineland	Nov. 11, '46	Berkshire Med. School, Mass.
Moore, Joseph	Bridgeton	Mar. 6, '52	Jefferson College, Phila.
Moore, John H	Bridgeton	Mar. 15, '80	University of Phila.
McTaggart, Miles F		Apr. 25, '65	Eclectic Med. College of Pa.
Paullin, George M	Shiloh	Mar. 14, '61	University of Penna., Phila.
Potter, J. Barron	Bridgeton	June 26, '48	New Jersey Medical Society.
Putnam, Joseph H	Bridgeton	Mar. 3, '64	Bellevue Col. of Med., N. Y.
Phillips, Charles C	Deerfield	Feb. 26, '53	Phila. College of Medicine.
Streets, Jacob G	Bridgeton	June 1, '66	Pa. Col. of Hom. Med., Phila.
Streets, David R	Bridgeton	Mar. 15, '80	University of Penna., Phila.
Stathem, Thomas E	Greenwich	Mar. 15, '60	University of Penna., Phila.
Smith, Thomas J	Bridgeton	Mar. 14, '66	University of Penna., Phila.
Sturdivant, Thomas	Millville	Mar. 1, '60	Penna. Med. Univ., Phila.
Snyder, Sharp M	Cedarville	Mar. 11, '65	University of Penna., Phila.
Shippard, Joseph	Bridgeton	July 4, '51	New Jersey Medical Society.
Tuller, Emery R	Vineland	Feb. 7, '62	Western Hom. Col., Cleve., O.
Tuller, Malcom B	Millville	Mar. 10, '73	Hahneman College, Phila.
Tomlinson, George	Roadstown	June 14, '31	New Jersey Medical Society.
Whitaker, Jonathan S	Millville	Mar. 20, '45	Jefferson College, Phila.
West, Maxamillian	Millville	Mar. 12, '75	University of Penna., Phila.
Wright, Lucretia Minerva	Bridgeton	Mar. 5, '73	New England Female Col.
Willets, J. Howard	Port Elizabeth	Mar. 9, '58	Jefferson College, Phila.
Wilson, Stacy M	Leesburg	Mar. 13, '69	University of Penna., Phila.
Wheaton, Theodore C	Millville	Mar. 14, '79	University of Penna., Phila.
Woodruff, William L		Mar. 14, '82	Hahneman College, Phila.

* Matriculate Jefferson Medical College.

ESSEX COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Anderson, H. J		Mar. 4, '75	Hom. Med. College of N. Y.
Andrews, William J		Mar. 2, '65	Medical College of Ohio.
Alba, F. T		July 11, '46	Norwich University.
Annin, Jonathan		May 20, '29	Med. Society of New Jersey.
Ah, Poter Van			Sanitary Board.
Bailey, Charles H		Mar. 1, '69	Columbia College.
Bradin, Edward DeL		Mar. 12, '77	University of Pennsylvania.
Barnett, S. Amelia		Mar. 1, '65	N. Y. Med. Col. for Females.
Bayles, George		Mar. 8, '59	University of State of N. Y.
Bennett, Frederick W		Feb. 27, '78	Columbia College.
Bruyere, Walter Reeve		Mar. 1, '78	Columbia College.
Brundage, A. H		Mar. 7, '55	University of City of N. Y.
Berry, William B		Mar. 1, '76	Columbia College.
Baker, Walter S		Mar. 4, '63	Hom. Med. College of N. Y.
Brumley, John D		Mar. 2, '58	Med. College of New York.
Ball, Albert		Nov. 27, '72	University Wirzburg.
Burrage, Robert Lowell		Mar. 1, '78	Med. Col. of Bellevue Hosp.
Bleyle, Herman Conrad		Mar. 1, '68	Med. Col. of Bellevue Hosp.
Bradfield, Thomas R		Feb. 28, '70	Columbia College.
Burnett, Jacob B		Mar. 2, '66	Univ. of the City of N. Y.
Belmer, Randolph		Feb. 18, '78	Univ. of the City of N. Y.
Burdge, Paul Wesley		Mar. 26, '78	American Univ. of Phila.
Burling, John		Feb. 11, '74	Hosp. Col. of Hom., Cleve., O.
Baldwin, Aaron K		Feb. 26, '61	Univ. of the City of N. Y.
Buttner, Charles		May 26, '75	Med. Soc. of New Jersey.
Borts, Isaac		Mar. 1, '74	Med. Col. of Bellevue Hosp.
Blackelock, G Clinton		Feb. 28, '78	N. Y. Hom. Med. College.
Bell, Wilson F		Mar. 10, '46	Univ. of the City of N. Y.
Baldwin, Milton		May, 12, '46	Med. Soc. of New Jersey.
Buob, Eva		Aug. 18, '78	St. Em. Hosp., W. Is. (License).
Bergman, Mrs		Feb. 20, '74	C. of E. of M., Berlin (License).
Butler, Clarence W		Feb. 29, '72	N. Y. Med. Hom. Col.
Bruen, Julia M		Feb. 23, '81	N. Y. Eclectic Med. Col.
Boskowitz, George W		Oct. 7, '77	N. Y. Eclectic Med. Col.
Bachmann, Carl, (certif.)		June 7, '80	Soc. Hom. Hahne., Stuttgart.
Bennett, Charles D		May 13, '81	Columbia College.
Barrett, Albert R		Mar. 1, '77	University of Tennessee.
Baker, Frank Edwin		May 16, '82	Columbia College.
Bailey, Isaiah W		Aug. 20, '81	Electropathic Inst. of Phila.
Baldwin, T. H			N. Y. College of Hom. Med.
Chandler, William J		Feb. 28, '68	Columbia College.
Cusack, Thomas G		Feb. 16, '80	Univ. of the City of N. Y.
Cross, Jeremiah A		Mar. 10, '56	Albany Medical College.
Coursen, John W		Feb. 23, '42	Albany Medical College.
Christian, M. Osborne		Mar. 2, '78	Howard University.
Corwin, Joseph		Mar. 6, '35	Yale College.
Clark, Robert W		Mar. 11, '61	Univ. of the City of N. Y.
Corwin, Theodore W		Feb. 28, '76	Columbia College.
Clark, Augustus M		Mar. 27, '58	Univ. of the State of N. Y.
Campbell, Wellingt'n, Jr		Mar. 1, '77	Columbia College.
Casey, James H		Mar. 1, '75	Columbia College.
Clark, Jacob Henry		May 13, '81	Columbia College.
Currie, Margaret C		Mar. 1, '81	U. S. Med. Col. of N. Y.
Chambers, Talbot R		Mar. 1, '78	Columbia College.
Corrigan, Joseph		Mar. 1, '71	Columbia College.
Clarke, Margaret E		Aug. 23, '71	Med. Col. of N. Y. for Females.

ESSEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Crane, Henry Bedell		Apr. 13, '83	University of Pennsylvania.
Cort, Henry L.		May 25, '83	Columbia College.
Dill, Daniel M.		June 26, '67	University of Michigan.
Day, Fanny M.		Apr. 1, '80	Med. Acad of N. Y. for Fem.
Davis, Joseph A.		June 26, '40	Med. Soc. of New Jersey.
Darlington, Thomas		Mar. 12, '80	Columbia College.
Duncker, Frederick W.		Mar. 1, '66	Med. Col. of Bellevue Hosp.
Dunker, John F.		Mar. 5, '57	Medical College of New York.
Dennis, Laban		Mar. 8, '66	Columbia College.
Duryee, John L.		Feb. 28, '66	Columbia College.
Dutcher, Benjamin C.		Sept. 25, '32	Med. Soc. of New Jersey.
Duffenbach, Rich'd G. P.		Mar. 3, '74	Columbia College.
Dougherty, Alexander N.		Mar. 6, '45	Univ. of the State of N. Y.
Dorn, Louise			Inst. Mid. of Jena (License).
Dressler, Anna F.		June 27, '78	Univ. of Leipzig (License).
Dougherty, Arthur C.		May 6, '82	Columbia College.
Delcourt, Adolph			Certificate.
Duncker, Charles Henry			U. S. Medical College.
English, Thomas D.		Apr. 5, '39	University of Pennsylvania.
Elliott, Jacob		Mar. 7, '50	Univ. of the City of N. Y.
Eyen, Anna Maria		Jan. 15, '75	N. Y. German Priv. Inst. of Midwifery (Certificate).
Elsasser, Wilhemine		Jan. 28, '63	Certif. of Dr. Jos. Kammerer.
Elliott, Daniel		Nov. 9, '80	Columbia College
Eaton, Samuel L.		Feb. 9, '82	Hahneman Medical College.
Franklin, Benjamin		Mar. 2, '60	Univ. of the City of N. Y.
Friess, Frederick		Mar. 8, '75	Hom. Med. College of N. Y.
Freeborn, Georgius C.		Feb. 27, '73	Columbia College.
Frazer, Samuel H.		Mar. 7, '70	Eclectic Med. Col. of N. Y.
Fewsmith, Joseph		Mar. 2, '74	Columbia College.
Fowler, Almira L.		Jan. 27, '53	Med. Col. of Pa. for Females.
Fonda, Edward S.		Mar. 5, '79	U. S. Medical College.
Falken, Alexander E. E.		—— —, '81	U. S. Medical College.
Forbes, Lucy S.		Mar. 29, '81	N. Y. Med. Col. for Women.
Falk, Barbara			G. D. School of Midwifery.
Francsovits, Theeka			University of Vienna.
Gray, Thomas N.		Feb. 28, '79	Columbia College.
Gray, William R.		July 1, '67	Univ. of the City of N. Y.
Gillin, Robert F.		Feb. 17, '79	Univ. of the City of N. Y.
Grover, William B.		May 12, '45	Medical Soc. of New Jersey.
Gile, Francis A.		Mar. 4, '75	N. Y. Hom. Medical College.
Gill, Mrs. Rosa		Oct. 11, '81	G. O. M. I., N. Y., (Certif.).
Gedicke, Herman W.		Feb. 27, '82	Med. College of Evansville.
Graves, William B.		Feb. 17, '80	University of New York.
Garlner, Susanna		Aug. 29, '70	Certificate by A. Kriecher.
Guenther, Emil Ernest			Univ. of the City of N. Y.
Gerbert, H. P.			Col. Physicians and Surgeons.
Gray, Richardson			Columbia College.
Hester, Jacob		Apr. 1, '60	Penn Med. Univ. of Phila.
Howe, Edward J.		Feb. 27, '73	Columbia College.
Harvey, Thomas W.		Mar. 1, '78	Columbia College.
Haight, Trevonian		July 30, '64	Hosp. Col. of Long Island.
Holden, Edgar		Mar. 14, '61	Columbia College.
Hinds, Harriette C. Z.		Mar. —, '77	Eclectic M. C. of City of N. Y.
Hickey, Daniel C.		May 1, '64	Med. Soc. of the State of N. Y.
Herold, Herman C. H.		Mar. 1, '78	Med. Col. of Bellevue Hosp.

ESSEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Holloway, Henry D.		Feb. 26, '80	Eclectic Med. College of N. Y.
Hagar, John F.		Feb. 27, '73	Columbia College.
Hewlett, P. V. P.		Mar. 2, '68	Univ. of the City of N. Y.
Hollister, L. Eugene		Mar. 26, '73	University of Michigan.
Hagen, Charles W.		Feb. 22, '61	Med. College of St. Louis.
Haydon, J. H.		Feb. 20, '72	Univ. of the City of N. Y.
Hedges, Joseph		Mar. 8, '60	Univ. of the State of N. Y.
Haines, Ella		Mar. 15, '71	Med. Col. of Penna. for Fem.
Hunter, C. H.		Mar. 3, '57	Univ. of the City of N. Y.
Hitchcock, Wm. Edwin		Jan. 10, '66	Yale College.
Holmes, William H.		Mar. 3, '59	Medical College of New York.
Heinrich, Johanna		Aug. 17, '65	Dr. J. T. Van Herder (License).
Hathaway, Maria Haring		Feb. 18, '70	New York Med. Eclectic Col.
Helf, Maria Ann		May 21, '40	I. of M., Trier, Ger. (License).
Hendry, Hugh Campbell		Mar. 1, '72	Bellevue Hosp. Med. College.
Hussey, Mary Dudley		Mar. 27, '77	Women's Med. Col., N. Y. Inf.
Hayward, Anna		Mar. 17, —	Med. Col. of Penna. for Fem.
Hess, Louise		Dec. 10, '72	Royal State Midwife School Wurtemberg, Ger. (Certif.)
Hedden, John H.		July 26, '82	University of Vermont.
Hemsel, Rosalea			University Budapest, Hung.
Hudnut, Frank Parker		Oct. 1, '83	Bellevue Hosp. Med. Col.
Ill, Edward J.		Mar. 1, '75	Columbia College.
Ill, Fredolin		July 10, '55	Medical Soc. of New Jersey.
Iliff, Elias P.		June 21, '77	Long Island Hosp. College.
Jones, S. Wasson		July 26, '72	Long Island Hospital Col.
Janes, John E.		May 1, '76	Med. Col. of Bellevue Hosp.
Johnson, William M.		June 30, '81	University of Michigan.
Johnson, Frank Walter		June 29, '70	Univ. (American) of Phila.
Kipp, Charles J.		Mar. 14, '61	Columbia College.
Kent, George R.		Mar. 1, '67	Med. Col. of Bellevue Hosp.
Korneman, Henry A.		Feb. 28, '72	Columbia College.
Küchler, Maximilian		Apr. 16, '60	Med. Soc. of New Jersey.
Krämer, Gertruth		May —, '70	Dr. H. Hessler's Institute.
Kiersted, Christopher		Dec. 30, '80	Med. Soc of State of N. Y.
King, Joseph Henry		June 10, '71	American Univ. of Phila.
King, Joseph Henry		June 25, —	Eclectic College of Penna.
Kurz, Richard E.			(College name not legible).
Lyon, Ernest M.		Mar. —, —	Med. Col. of Bellevue Hosp.
Lyon, Selvan Smith		Feb. 13, '76	Eclec. Med. Col., City of N. Y.
Laine, Edmund R.		Mar. 1, '68	Hom. Med. Col. of N. Y.
Lehlbach, Charles F. J.		Mar. 6, '56	Univ. of the State of N. Y.
Love, J. J. H.		Mar. 7, '55	Univ. of the City of N. Y.
Lehmacher, Francis		Feb. 15, '64	University Greifswald.
Lauterborn, William F.		Feb. 13, '80	Univ. of the City of N. Y.
Loweree, Thomas W.		May 9, '65	Columbia College.
Little, Herbert W.		June 27, '78	Yale College.
Lounz, Maria		——— —, '62	Univ. Vienna (Certificate).
Lawrence, Elijah W.		Apr. 28, '63	Eclectic Med. Col. of Phila.
Lippa, John Jacob		July 9, '81	Univ. of the City of N. Y.
Maxwell, Thomas M.		Feb. 15, '75	Univ. of the City of N. Y.
Morgan, John C.		Feb. 14, '75	Univ. of the City of N. Y.
Munn, Charles W.		Mar. 10, '66	Jefferson College of Penna.
Martland, William H.		Mar. 6, '73	University of Michigan.
Mercer, Archibald		Mar. 6, '71	Columbia College.
Miller, John F.		July 27, '65	Long Island Hospital Col.

ESSEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Mandeville, Fred'k B....	....	Mar. 4, '63	Hom. Med. Col of N. Y.
Mun, Mary F.............	....	Mar. 21, '72	Med. Acad. of N. Y. for Fem.
Mershon, R. B............	....	Mar. 5, '39	Jefferson College of Penna.
Mershon, Stacy B.........	....	Mar. 1, '74	Med. Col. of Bellevue Hosp.
Mills, Andrew M..........	....	June 7, '59	University of Vermont.
Mahr, Henry..............	....	Aug. 14, '40	University of Munich
Meeker, George F.........	....	Jan. 25, '76	Eclectic Col. of New York.
McDermott, John R.......	....	Feb. 19, '77	Univ. of the City of N. Y.
Mulcahy, Dennis D.......	....	Feb. 28, '72	Columbia College.
Muhlfeld, Henry..........	....	Oct. 1, '76	Med. Col. of Bellevue Hosp.
Mergott, Mrs. Hedwig....	....	Aug. —, '79	Dr. Heinrich Hester (License).
Merz, Mrs. Henriette.....	....	Nov. 28, '60	City of Hanau, Ger. (License).
Marsh, Stewart C.........	....	June 8, '37	Medical Soc. of New Jersey.
Murphy, Jane H...........	....	Nov. 1, '80	C. S. Lozier, M.D. (Certificate).
Mead, Isaac................	....	Apr. 1, '28	Geneva College of New York.
Miller, Charles H.........	....	Mar. 2, '76	N. Y. Hom. Medical College.
Metcalf, Jewett...........	....	Mar. 10, '75	Hahneman Medical College.
Mitchell, Charles P.......	....	Nov. 12, '78	Royal Col. of Sur. of England.
Morris, Florillo B........	....	Mar. 11, '65	University of Pennsylvania.
Mead, Sarah Rebecca.....	....	June —, '83	Med. Col., City of New York.
Mueller, Louis E..........	....	....	(College name not legible).
Nichols, Edward P........	....	Mar. 4, '52	Univ. of the State of N. Y.
Northrup, Emerson S.....	....	Mar. 12, '79	N. Y. Med. of Hom. College.
Nimson, Anna T...........	....	Mar. 23, '68	N. Y. Med. Col. for Women.
Newgeon, Mary F.........	....	Mar. 1, '81	U. S. Medical College.
Noger, Vincento...........	....	May 24, '82	N. J. Med. Soc. (Certificate).
Norton, Arthur B.........	....	....	Homœopathic Medical Col.
Osborne, Charles H.......	....	Mar. 17, '79	Univ. of the City of N. Y.
Osborne, Edward A.......	....	Mar. 29, '48	Jefferson College of Penna.
Osborne, Joseph D........	....	Mar. 8, '59	Univ. of the State of N. Y.
O'Gorman, William........	....	Jan. 17, '54	Royal College of Surgeons.
Pinkham, John Warren...	....	—— —, '66	Bellevue Hosp. Med. Col.
Peck, Edward E...........	....	Mar. 1, '79	Bellevue Hosp. Med. Col.
Pierson, W., Jr...........	....	Mar. 9, '52	Univ. of the City of N. Y.
Pett, Jesse B..............	....	Mar. 1, '70	Homœopathic Col. of N. Y.
Pindell, William N........	....	Mar. 7, '48	Academy of Maryland.
Phelps, Eliza B...........	....	Apr. 2, '70	N. Y. Med. Col. for Females.
Poiner, Frances, *nee* Stanner..................	....	Aug. 30, '67	Karl Ferdinand University Prag. Austria (License).
Pfeiffer, Nicholas.........	....	Feb. 1, '63	Penn. Medical College.
Pennington, Samuel H...	....	May 1, '80	Medical Soc. of New Jersey.
Paine, Howard S..........	....	Mar. 3, '81	Albany Medical College.
Pilkin, Leonard F.........	....	June 19, '78	Univ. of the City of N. Y.
Pease, Charles E..........	....	Mar. 15, —	University of Pennsylvania.
Pyrum, Mrs. Elizabeth...	....	....	(College name not legible).
Rankin, William...........	....	Mar. 1, '71	Columbia College.
Robinson, Manning N....	....	Feb. 20, '60	University of Art of N. Y.
Rand, John M..............	....	Nov. 10, '58	Dartmouth College.
Ricord, Philip..............	....	Feb. 28, '68	Columbia College.
Robinson, Morton.........	....	—— —, '54	Metropolitan Med. College.
Robinson, W. R...........	....	Mar. 5, '57	Univ. of the City of N. Y.
Ransom, A. A.............	....	Mar. 1, '67	Univ. of the City of N. Y.
Reed, Joshua W...........	....	June 1, '67	Bellevue Hospital College.
Reul, Elizab'th, *nee* Held..	....	Dec. 21, '59	Governm't Nassau (License).
Robinson, George W......	....	Mar. 14, '67	Columbia College.
Reuss, Margaretta.........	....	Oct. 31, '75	M. I. Marburg, Ger. (License).

ESSEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Richards, George W		Mar. 4, '53	Univ. of the State of N. Y.
Rau, Jacob		Apr. 20, '49	Governm't Wurtemberg (Ger).
Roden, Hugh P		Mar. 10, '70	Missouri Medical College.
Roche, Gulielmus		Feb. 22, '81	N. Y. Eclectic Med. College.
Rolle, Eliza		Feb. 18, '81	Drs. Gengenbacher & others (License).
Richert, Edward T		Mar. 14, '79	University of Pennsylvania.
Robinson, William D		Mar. 1, '59	Bellevue Hosp. Med. College.
Smith, William A		Jan. 26, '47	Geneva College.
Schureman, C. A		Mar. 1, '71	Univ. of the City of N. Y.
Schureman, A. J		Feb. 20, '72	Univ. of the City of N. Y.
Stickney, Charles W		Mar. 27, '58	University of Pennsylvania.
Smith, D. W		Mar. 7, '56	Univ. of the City of N. Y.
Stevens, Frederick H		June 18, '51	Medical College of Castleton.
Smith, D. S		Mar. 7, '55	Univ. of the City of N. Y.
Southard, Lott		June 22, '52	Geneva College.
Sutphin, Theron Y		Mar. 1, '73	Bellevue Hosp. Med. College.
Sutphin, R. M		Mar. 9, '47	Univ. of the City of N. Y.
Smith, E. Fayette		Mar. 1, '76	Columbia College.
Stiles, Anna M		Mar. 20, '73	Med. Acad. of N. Y. for Fem.
Staehlin, Robert		Feb. 27, '73	Columbia College.
Spreng, Justus J		Mar. 7, '64	Medical College of N. Y.
Skinner, D. M		Mar. 10, '58	Univ. of the City of N. Y.
Schœffler, Ernest		July 22, '69	Fred'k Wilhelm Univ., Prus.
Seward, John L		Mar. 14, '67	University of Pennsylvania.
Sweet, Jonathan R		——, '54	Metropolitan Medical Col.
Schilling, William		May 7, —	New Jersey Hom. Med. Soc.
Stachle, Mrs. Louis		Oct. 17, '68	Dr. K. Jost, N. Y. (License).
Swords, George P		May 13, '81	Columbia College.
Schrewsbury, William J		Mar. 3, '81	Hom. College of New York.
Stickler, Joseph W		Feb. 28, '79	Columbia College.
Stillwell, John A		Mar. 9, '82	Howard University.
Simpson, James Y		May 16, '82	Columbia College.
Sweeny, D		Feb. 28, '82	Keokuk Medical College.
Schmitz, Caroline		Nov. 3, '76	Univ. of Giessen, Ger. (Certif.)
Sterling, Charles Fred'k		May 24, '79	Public Medical Col., Cin., O.
Stanwood, Robert Given		July 5, '78	Bowdoin College.
Shelton, Charles H			New York Hom. Med. Col.
Taft, Amanda W		May 15, '76	Eclec. Med. Col., City of N. Y.
Taft, Simon P		Feb. 3, '74	Eclec. Med Col., City of N. Y.
Titus, William		Jan. 25, '66	Eclec. Med. Col. of Penna.
Taylor, Samuel W		Mar. 1, '62	Hom. Med. Col. of N. Y.
Thompson, Edwin B		Feb. 24, '57	Univ. of the City of N. Y.
Tichenor, H. H		Mar. 11, '54	Univ. of the City of N. Y.
Taylor, Elizabeth J		Mar. 25, '73	College of N. Y. Infirmary.
Thompson, David		Mar. 1, '69	Columbia College.
Tetreault, Francis J. E		Apr. 7, '80	Univ. of Bish. Col., Canada.
Treptow, Carl F. W		Feb. 22, '81	N. Y. Eclec. Medical College.
Taylor, John L		Mar. 1, '80	Bellevue Hosp. Med. College.
Thomas, B. Franklyn		Jan. 29, '78	Eclectic Med. Col. of N. Y.
Tompkins, Abraham W			Eclectic Med. Col. of N. Y.
Underwood, Charles F		Oct. 1, '74	Bellevue Hosp. Med. Col.
Van Duyn, S. W		Mar. 10, '65	Univ. of the City of N. Y.
Van Wagener, Geo. A		Mar. 1, '71	Columbia College.
Vail, M. H. C		June 22, '51	Castleton Medical College.
Vogler, Charles		May 25, '81	Med. Soc. of New Jersey.

ESSEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Wickes, Stephen		Mar. 27, '34	University of Pennsylvania.
Wyeth, Malborough C		Mar. 1, '78	Columbia College.
Wright, Joseph R		Feb. 17, '79	Univ. of the City of N. Y.
Ward, Edwin M		May 9, '62	Columbia College.
Ward, Emma C.		June 15, '70	N. Y. Hosp. Med. Col. for Fem.
Ward, William S		May 7, '49	Med. Soc. of New Jersey.
Whittingham, Edward T.		Mar. 9, '52	Academy of Maryland.
Wrightson, James T		Mar. 1, '78	Academy of Maryland.
White, William H		Mar. 3, '60	Pennsylvania College.
Ward, Arthur		May 9, '48	Med. Soc. of New Jersey.
Ward, George Smith		Mar. 22, '49	Univ. of the State of N. Y.
Wynans, Henry D		Mar, 7, '50	Univ. of the City of N. Y.
Whitehome, Henry B		Jan. 20, '74	Albany Medical College.
Wilmarth, Francis		Feb. 28, '68	Columbia College.
Wade, Joseph L		Mar. 7, '50	Univ. of the City of N. Y.
Ward, Leslie D		Feb. 28, '68	Col. of Phys. and Surg., N. Y.
Whitehead, Ira C		Nov. 20, '45	Berker Medical School.
Wallace, David L		Mar. 1, '75	Bellevue Hosp. Med. Col.
Wright, Alfred S		Mar. 1, '78	Columbia College.
Whitehead, Isaac P		May 27, '74	N. Y. Med. Eclectic College.
Wilder, Alexander		Jan. 5, '81	U. S. Medical College.
Ward, Joseph B		Feb. 27, '57	Med. Hom. Col. of Penna.
Walton, Alfred		June 25, '79	Harvard University.
Ward, Jacob H		Apr. —, '79	Victoria College.
Wilson, John Eastman		Mar. 15, '83	N. Y. Hom. Medical College.
Wallace, Daniel		Apr. 30, '83	Affidavit—40 years' practice.
Young, Charles		Mar. 8, '66	Columbia College.
Young, J. Coddington Jr.		Feb. 27, '73	Columbia College.
Yarnall, James H			Eclectic Medical College.
Zeh, Charles M		June 14, '48	Castleton Med. Col., Vt.

GLOUCESTER COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Abbott, Clarence G	Woodbury	Mar. 10, '79	Hahneman College, Phila
Ashcraft, John H	Mullica Hill	Mar. 10, '55	Jefferson Med. College, Phila.
Backus, Boardman P		Mar. 6, '81	Eclec. M. Col., Novi Chorari.
Baker, C. A		Mar. 9, '67	Jefferson Med. College, Phila.
Beckett, Albert T	Salem	Mar. 10, '73	Hahneman College, Phila.
Buckingham, Henry G	Clayton	Mar. 3, '75	Columbia College, Phila.
Buzby, Benjamin F	Swedesboro	Mar. 12, '77	University of Penna., Phila.
Carter, Reuben		Feb. 11, '79	University of Penna., Phila.
Chew, Edmund	Mantua	Mar. 9, '76	University of Phila., Pa.
Clark, Henry C	Woodbury	Apr. 5, '53	University of Penna., Phila.
De Groff, Eugene E	Mullica Hill	Mar. 12, '75	Jefferson Med. College, Phila.
Duffell, Charles	Clayton	Mar. 8, '62	Jefferson Med. College, Phila.
Edwards, J. Gaunt	Williamstown	Mar. 1, '78	Bellevue H. M. Dept., N. Y.
Finch, Lemuel E	Wenonah	Mar. 10, '79	Hahneman College, Phila.
Glover, William A	Woodbury	Mar. 9, '76	Hahneman Med. Col., Phila.
Garrison, Charles F	Camden	Mar. 12, '72	University of Penna., Phila.
Gardiner, Daniel R	Woodbury	Mar. 15, '49	Hom. Med. Col., Phila.
Halsey, Luther M	Swedesboro	Mar. 13, '80	Jefferson Med. College, Phila.
Heritage, J. Down	Glassboro	Mar. 14, '63	University of Penna., Phila.
Heritage, Paul S	Mantua	Mar. 12, '72	University of Penna., Phila.
Iszard, Jacob	Harrisonville	Mar. 9, '70	Hahneman Med. Col., Phila.

GLOUCESTER COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Jackson, Winslow	Bridgeport	Mar. 8, '51	University of Penna., Phila.
Keasbey, John B.	Woodbury	Apr. 1, '54	University of Penna., Phila.
Laws, George C.	Paulsboro	Mar. 14, '71	University of Penna., Phila.
Lee, Thomas	Glassboro	Mar. 10, '76	University of Penna., Phila.
Lippincott, Joshua	Harrisonville	Feb. 9, '75	University of Phila., Pa.
Longacre, Joseph S.	Bridgeport	Mar. 27, '79	Eclectic Med. Col. of Penna. (Buchanan).
Miller, Samuel T.	Paulsboro	Apr. 8, '50	University of Penna., Phila.
Musgrave, John F.	Swedesboro	Mar. 6, '83	Hahneman College, Phila.
McGeorge, Wallace	Woodbury	Feb. 28, '68	Hahneman College, Phila.
McKelvey, Alexander J.	Williamstown	Mar. 4, '35	Jefferson Med. College, Phila.
Oliphant, Eugene T.	Bridgeport	Mar. 12, '73	University of Penna., Phila.
Porch, Albert	Clayton	Mar. 9, '67	Jefferson Med. College, Phila.
Reeves, Edward L.	Paulsboro	Mar. 5, '59	Med. Col. of Penna., Phila.
Reeves, Robert	Paulsboro	Apr. 2, '83	Jefferson Med. Col. of Penna.
Smith, Asa A.	Franklinville	Mar. 12, '64	University of Penna., Phila.
Stamback, Henry L.	Mullica Hill	Mar. 10, '79	Hahneman College, Phila.
Stanger, Samuel F.	Harrisonville	Mar. 12, '70	Jefferson College, Phila.
Trenchard Albert	Mantua	Mar. 12, '70	Jefferson Med. College, Phila.
Turner, Thomas B.	Glassboro	Mar. 12, '75	University of Penna., Phila.
Ware, John D.	Woodbury	Mar. 10, '76	University of Penna., Phila.
Weatherby, Joseph C.	Clarksboro	Mar. 31, '37	University of Penna., Phila.
Westcott, E. Seymour		Apr. 2, '83	Jefferson Med. College Phila.

HUDSON COUNTY.

Abercrombie, William H.		Feb. 29, '72	Hom. Med. Col., New York.
Allen, Ulamor		Mar. 13, '80	Univ. of the City of N. Y.
Andrews, B. A.		Mar. 1, '69	Bellevue Hosp. M. Col., N. Y.
Adams, Hugh T.		Oct. 14, '69	Queen's Univ., Ireland (Surg.)
Adams, Hugh T.		Oct. 14, '69	Queen's University, Ireland (Med. and Midwifery).
Allers, Henry		Mar. 8, '81	Univ. of the City of N. Y.
Bucher, John B.		Mar. 1, '73	Bellevue Hosp. M. Col., N. Y.
Bell, Henry		Mar. 19, '74	Georgiopolitan College.
Bier, Sophie		Aug. 19, '78	Midwifery Inst., N. Y. City.
Bridgeford, Mrs.		June 11, '69	M. S., R. C. S., Edinburgh.
Bresgleb, William		Mar. 6, '81	U. S. Med. Col., N. Y.
Brickner, M. F.		Mar. 6, '54	Ec. Med. Col. of Pa., Phila.
Belmer, Randolph		Feb. 28, '78	Univ. of the City of N. Y.
Bradford, George A.		Mar. 1, '82	Eclectic Med. Col. of N. Y.
Bidwell, Horace Gilbert		Mar. 1, '72	Bellevue Hosp. M. Col., N. Y.
Brush, H. Mortimer		Mar. 1, '62	Univ. of the City of N. Y.
Backus, Boardman P.		Mar. 6, '81	New York Eclectic Med. Col.
Buffett, Edward P.		Oct. 8, '57	Col. of Phys. and Surg., N. Y.
Crosby, Henry L.		——, '54	Metropolitan Medical College.
Clawson, S. W.		Mar. —, '67	Univ. of the City of N. Y.
Cropper, Charles W.		Mar. 1, '76	Bellevue Hosp. M. Col., N. Y.
Culver, Daniel W.		Nov. 2, '43	Med. Col. of Castleton, Vt.
Cadmus, W. J.		Feb. 28, '70	Univ. of the City of N. Y.
Clark, Samuel W., Jr.		Mar. 3, '81	Hom. Med. Col., N. Y. City.
Craig, James		Mar. 4, '61	Univ. of the City of N. Y.
Cahill, Hugo H.		Feb. 19, '73	Med. Eclectic Col. of N. Y.
Chabert, Romeo F.		Mar. 9, '56	University of New York.

HUDSON COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Dickinson, G. K		Mar. 1, '77	Bellevue Hosp. M. Col., N. Y.
Derby, Nelson R		Apr. 18, '49	University of Buffalo, N. Y.
DeHart, Sarah E		Mar. 23, '70	Female Med. College, N. Y.
DeLamater, Chas. H., Jr.		Feb. 23, '81	New York Col. of Dentistry.
Durrie, William A		Feb. 28, '77	Hom. Med. Col., N. Y. City.
Dallas, Alexander		Mar. 11, '78	Univ. of the City of N. Y.
Dewey, Raphael P		June 20, '70	Eclectic Med. Col. of Penna.
Deraismes, Edward J		July 10, '82	Univ. of the City of N. Y.
Darlington, William L.		Mar. 11, '75	Jefferson Med. College, Phila.
Exton, J. A		Mar. 8, ,66	Col. of Phys. and Surg., N. Y.
Eddy, H. McC		Mar. 9, '72	Univ. of the City of N. Y.
Elder, Lorenzo W		—— —, '47	Col. of Phys. and Surg., N. Y.
Everitt, John R		May 26, '72	Col. Hospital of Long Island.
Fry, Richard Watson		June 27, '72	University of Virginia.
Faber, John		Mar. 2, '75	Col. Fredk. & Alex., Bavaria.
Fisher, William R		Mar. 12, '67	Columbia College, N. Y. City.
Fuller, Madana B		Mar. 23, '68	Female Med. Acad., N. Y.
Fonda, Edward S		Mar. 5, '79	U. S. Medical College, N. Y
Glassford, Robert W		Mar. 1, '78	Col. of Phys and Surg., N. Y.
Golding, J. Frederick		Mar. 1, '75	Columbia College, N. Y. City.
Gordon, Leonard J		Mar. 1, '75	Bellevue M. Col. Hosp., N.Y.
Giovanne, Marini E		—— —, '78	University Geneva.
Gedicke, Herman W		Feb. 27, '82	Med. Col. of Evansville, Ind.
Henke, Adelheid		Dec. 9, '79	Midwife Institute, N. Y. City.
Hoffman, A. C		Mar. 1, '76	Col. of Phys. and Surg., N. Y.
Hinchman, Melissa		Feb. 3, '78	Eclectic Med. Col., N. Y. City.
Heppenheimer, Fred'k C.		Mar. 18, '80	University, Bavaria.
Hornblower, Josiah		Mar. 9, '60	Univ. of the City of N. Y.
Helfer, Samuel Alexander		Mar. 14, '75	Univ. of the City of N. Y.
Hasse, Henry W. A		Mar. 8, '76	Univ. of the City of N. Y.
Henry, John P		May 13, '81	Col. of Phys. and Surg., N. Y.
Hardenberg, D. S		May 28, '63	Albany Medical College.
Hoffman, Peter		July 9, '81	Univ. of the City of N. Y.
Hoff, J. A		Mar. 9, '69	Univ. of the City of N. Y.
Hammell, Philemon		Sept. 26, '82	Col. of Phys. and Surg., N. Y.
Hunt, Hart Eben		Mar. 1, '82	Eclectic Med. Col., N. Y. City.
Hillegas, Willard		Mar. 4, '81	Albany Medical College.
Hetzel, Charles J		Mar. 6, '80	Eclectic Med. Col., N. Y. City.
Hunt, John W		—— —, '59	Univ. of the City of N. Y.
Julian, John M		June 23, '80	Long Is. Col., Brooklyn, N. Y.
Johnson, William M		June 30, '81	Univ. of the State of Mich.
Kudlich, William Tell		Mar. 1, '76	Col. of Phys. and Surg., N. Y.
Keating, John		Mar. 1, '77	Bellevue Hosp. M. Col., N. Y.
Kitchen, George H		June 6, '70	Eclec. Med. Col. of Pa., Phila.
Kyte, C. F		Mar. 8, '81	Univ. of the City of N. Y.
Kirk, Thomas Morris		Mar. 3, '83	Univ. of the City of N. Y.
Kreckler, Fredericka		Sept. 28, '69	I. L. I. & M. In., of Hanover.
Kopetchny, Otticar E		Mar. 11, '76	Jefferson College, Penna.
Leaybron, Anna A		Apr. 5, '76	N. Y. Free M. Col. for Women.
Lutkins, William C		Mar. 15, '76	Univ. of the City of N. Y.
Lutkins, Alfred A		Mar. 15, '78	Univ. of the City of N. Y.
Linneburner, Charles A.		Feb. 28, '79	Col. of Phys. and Surg., N. Y.
Lampson, Mortimer		Mar. 8, '66	Col. of Phys. and Surg., N. Y.
Lignot, Charles A. J		Mar. 15, '76	Univ. of the City of N. Y.
Lynch, Henry H		Mar. 11, '78	Univ. of the City of N. Y.
Laidlaw, Alexander H		Mar. 1, '51	Hom. Med. Col. of Pa., Phila.

HUDSON COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Long, Horace A.		Mar. 10, '81	Bellevue Hosp. M. Col., N. Y.
Lindorme, Charles A. F.		Mar. 2, '81	U. S. Med. Col., N. Y. City.
La Rue, Frank E.		July 9, '80	Univ. of the City of N. Y.
Lawrence, Elijah W.		Sept. 28, '63	Philadelphia Medical College.
Lynch, Thomas		Mar. 1, '79	Bellevue Hosp. M. Col., N. Y.
Lockwood, Hilliard L.		Mar. 12, '79	Hom. Med. Col., N. Y. City.
Lester, Frank W.		Mar. 1, '78	Col. of Phys. and Surg. N. Y.
Lesser, Adolphus M.		Mar. 1, '82	Eclectic Medical Col. N. Y.
Lutze, Frederick H.		Mar. 16, '72	Hom Med. Col., N. Y. City.
Mölling, Peter Augustus		Mar. 11, '78	Univ. of the City of N. Y.
Mallalieu, A. W.		Mar. 1, '75	Col. of Phys. and Surg., N. Y.
Manaton, J. P.		June 23, '80	Brooklyn Medical Col., N. Y.
McBride, Lewis A.		Mar. 1, '81	Bellevue Hosp. M. Col., N. Y.
McCallum, George B.		July 1, '80	Univ. of the State of Mich.
McClellan, David		Mar. 14, '80	Hahneman M. Col., Chicago.
Meyer, George Irving		Mar. 1. '78	Col. of Phys. and Surg., N. Y.
McLean, Henrietta		Apr. 14, '77	Hygei's Therapeutic Col., Florence Heights, N. J.
Morris Stephen V.		Nov. 1, '77	Bellevue Hosp. M. Col., N. Y.
Mabon, William		Aug. 1, '81	Bellevue Hosp. M. Col., N. Y.
McDowell, William J.		Mar. 3, '74	University of Maryland, Balt.
Metcalf, George R.		Mar. 3, '74	Col. of Phys. and Surg., N. Y.
Means, V. C. B.		July 9, '81	Univ. of the City of N Y.
Moorehouse, Elias W.		Mar. —, '82	Univ. of the City of N. Y.
Moir, Henry C.		Mar. —, '72	Univ. of the City of N. Y.
McNeil, C. Holmes		Feb. 29, '72	Hom. Med. Col., N. Y. City.
Newell, William H.		Mar. 17, '59	M. D. Univ. of Pa, Phila.
Nichols, Francis		Mar. 1, '61	Pa. Hom. Med. Col., Phila.
Nast, Hugo		Mar. 9, '75	Jefferson Col., Phila, Pa.
Norris, H. Lee, Jr.		Aug. 9, '70	Royal College, Edinburgh.
Ossa, Louis Philip		Feb. 24, '76	Wash. M. U., Baltimore, Md.
Olds, Edward		Feb. 28, '56	West. Hom. Col., Cleve., O.
Olsen, Grenada P.		Mar. 3, '83	(College name not legible).
Pyle, Edwin W.		Mar. 13, '73	University of Penna, Phila.
Paul, James		Apr. 30, '69	University of Glasgow.
Pape, Gotthold		Mar. 17, '80	Univ. of the City of N. Y.
Pitts, George Frederick		Mar. 10, '72	Univ. of the City of N. Y
Peterson, Anna		Mar. 28, '76	Midwifery Inst., N. Y. City.
Parker, William J.		Mar. 1, '79	Bellevue Hosp. M. Col., N Y.
Pettigrew, F. W.		Jan. 30, '45	Roy. Col of Surg., England.
Pryum, Elizabeth Gordon		Mar. 1, '82	Eclectic M. Col, New Jersey.
Payn, F. G.			Jefferson College, Penna.
Pendergast, John J.		Feb. 28, '68	Col. of Phys. and Surg., also Columbia Col, N. Y.
Peacock, Rufus W		June 15, '75	Univ. of the City of N. Y
Rothe, Charles G. H.		Mar. 4, '80	Eclectic Med. College, N. Y.
Rae, Gualterum		Mar. 15, '76	Univ. of the City of N. Y.
Rue, Henry Bergen		Mar. 15, '80	University of Penna., Phila.
Reeve, Daniel L.		Apr. 14, '45	Univ. of the City of N. Y.
Rein, Louis		May 24, '70	Med. Soc. State of New Jersey.
Roth, Edward		Mar. 1, '80	Bellevue Hosp. M. Col, N. Y.
Roe, Carrie L.		Apr. 1, '74	N. Y. Med. Col. for Women.
Rector, Pierson.		May 28, '63	Albany Med. College, N. Y.
Squier, M Frederick		Feb. —, '72	Col. of Phys and Surg., N. Y.
Shelton, Charles H.		Mar. 5, '80	Hom. Med. Col., N. Y. City.
Straughn, Frederick		Mar. 1, '70	Maryland Academy, Balt.

HUDSON COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Streubel, Julius		Mar. 4, '80	N. Y. Eclectic Med. College.
Smith, Henry M		Mar. 1, '71	Col. of Phys. and Surg., N. Y.
Stout, Stephen V. W		Feb. 28, '68	Col of Phys. and Surg., N Y.
Salter, Joseph Ely		Mar. 10, '81	Bellevue Hosp. M. Col., N. Y.
Simmons, Harris R		Mar. 8, '77	N. Y. Col. of Hom. Medicine.
Somerville, John Alex		Mar. 9, '82	Univ. of the City of N. Y.
Sherwood, Henry De L		May 16, '82	Col. of Phys. and Surg., N. Y.
Schul, Charles A. G		May 24, '82	Med. Soc. State of New Jersey.
Sommer, Ida		Oct. 23, '82	Midwife Institute, N Y. City.
Sacchi, Angelo		Nov. 15, '76	University of Naples.
Saltonstall, G. D		Mar. 6, '82	University of New York.
Senftleben, Hugo H. E		Nov. 11, '54	Albertine Acad., Bradenburg.
Stoddard Freeman		Mar. 10, '64	Col. of Phys. and Surg., N. Y.
Smith, Fenimore Cooper		July —, '83	Univ. of the City of N. Y.
Toepper, Albert		Mar. 13, '74	Univ. of the City of N. Y.
Taylor, Paul I		Mar. 14, '75	Univ. of the City of N. Y.
Taylor, William H. O		Mar. 8, '81	Univ. of the City of N. Y.
Thomsen, James W		Mar. 10, '75	Hahneman Med. Col., Phila.
Van Vorst, John, Jr		Mar. 1, '74	Bellevue Hosp. M. Col., N. Y.
Vondy, Joseph H		Mar. 5, '51	Univ. of the City of N. Y.
Varick, William W		June 1, '76	Bellevue Hosp. M Col, N. Y.
Van Mater, John H		Mar. 15, '80	University of Penna., Phila.
Van Saun, John D		Mar. 1, '73	Bellevue Hosp Med. College.
Viers, Charles Otho		Mar. 1, '67	Bellevue Hosp. Med. College.
Van Houten, Hard'nb'gh		Mar. 6, '83	U. S. Med Col., N. Y. City.
Varick, Theodore R		May 8, '49	Med. Soc. of New Jersey.
Wright, William G		Mar. 1, '76	Col. of Phys. and Surg., N. Y.
Waldmeyer, Joseph R		May 26, '75	Med. Soc. of New Jersey.
Wigg, Cuthbert		Mar. 1, '80	Bellevue Hosp. Med. Col.
Watson, William P		Mar. 1, '78	Col. of Phys. and Surg, N. Y.
Watson, B. A		Mar. 4, '61	Univ. of the City of N. Y.
Wolfe, Theodore F		Feb. 28, '68	Col. of Phys. and Surg, N Y.
Warner, William B		Mar. 9, '82	Univ. of the City of N. Y.
Ware, William Powell		Mar. 1, '83	Eclectic Med. Col of N. Y.
Williams, John		Mar. 1, '77	Col. of Phys. and Surg., N. Y.
Zabriskie, William A		Oct. 11, '81	Col. of Phys. and Surg., N. Y.

HUNTERDON COUNTY.

A'Heron, T. M	Junction	Apr. 7, '74	Lying-in Hospital of Coombe.
A'Heron, T. M	Junction	Mar. 10, '73	Univ. of the City of N. Y.
Brown, Robert S. P		Mar. 12, '81	Jefferson College, Phila.
Berkaw, Willard E		Mar. 15, '81	University of Penna., Phila.
Best, George N.	Stockton	Mar. 12, '75	University of Penna., Phila.
Burd, Thos. B. J	Flemington	Mar. 10, '71	Hahneman Med. Col., Phila.
Bartow, George W	Clover Hill	Feb. 28, '72	Col. of Phys. and Surg., N. Y.
Burd, Thos. B. J	Flemington	Mar. 10, '71	Hahneman Med. Col, Phila.
Blane John	Perryville	Apr. 30, '27	Med Soc. State of New Jersey.
Closson, A. L		Mar. 21, '63	College of Medicine, Phila
Creveling, W. S.	Bloomsbury	Mar. 3, '51	Univ. of the City ot N. Y.
Ewing, John H	Flemington	Mar. 1, '77	Jefferson Med. College, Phila.
Frace, J. McCormick		Mar. 12, '77	University of Penna, Phila.
Grandin, John F	Clinton	Apr. 3, '52	University of Penna., Phila.
Hart, A. M	Ringoes		Affidavit—Filed April 25, '83.

HUNTERDON COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Hoff, J. O	Bloomsbury	Mar. 6, '69	Univ. of the City of N. Y.
Hunt, Thos. E	Glen Gardner	Mar. 9, '47	Univ. of the City of N. Y.
Hunt, Thos. E	Glen Gardner	Mar. 1, '78	Bellevue Medical College.
Harrison Samuel		June 12, '77	Univ. of the City of N. Y.
Jackson, David P		Mar. 2, '74	College of Miami, Cin., Ohio.
Knight, Moses D	Little York	Mar. 24, '61	University of Pennsylvania.
Leavitt, John F	Baptisttown	June 21, '81	Univ. of the City of N. Y.
Lowe, John N		Mar. 6, '62	Univ. of the City of N. Y.
Little, W. R	Bloomsbury	Mar. 15, '78	University of Penna., Phila.
Lawrence, B. M		Dec. 25, '65	N. Y. Hygeio Thera. College.
Larison, George H	Lambertville	Mar. 27, '58	University of Penna., Phila.
Miller, Frank W		Feb. 28, '73	University of Buffalo, N. Y.
Miller, Henry H		Mar. 7, '81	Univ. of the City of N. Y.
Miller, Theodore		Feb. 18, '73	Univ. of the City of N. Y.
McCaully, J. D		Mar. 15, '59	University of Penna., Phila.
Oliphant, Nelson B		Mar. 15, '80	University of Penna., Phila.
Pursel, W. W		Mar. 11. '74	Jefferson College, Phila.
Pittenger, A. S		Jan. 25, '70	Geneva Med. College, N. Y.
Pilkington, Horatio		Mar. 14, '79	University of Penna., Phila.
Ribble, George T	Milford	Mar. 1, '66	Bellevue Med. College, N. Y.
Reiley, Asher		Mar. 14, '49	Univ. of the City of N. Y.
Race, Henry		Mar. 31, '43	University of Pennsylvania.
Romine, George D	Lambertville	Mar. 15, '80	University of Pennsylvania.
Robbins, J. V	Ringoes	Mar. 4, '59	University City of N. Y.
Reading, Miller K		Feb. 10, '76	Col. of Phys. and Surg., N. Y.
Rowland, George	Flemington	Mar. 5, '53	College of Penna., Phila.
Reed, Rufus	Lambertville	Mar. 10, '70	Hahneman Med. Col., Phila.
Schuyler, Richard W	Schooley's Mt	Mar. 3, '81	Hom. Med. Col., N. Y.
Snyder, Q Emanuel		Mar. 1, '68	Med. Col. of Bellevue, N. Y.
Skillman, Thomas A	Quakertown	Feb. 17, '78	Univ. of the City of N. Y.
Smith, A. Carpenter	Bloomsbury	Apr. 5, '50	University of Penna., Phila.
Servis, Howard	Junction	——, '58	University of Pennsylvania.
Stiles, James E		May 10, '65	Med. and Sur. Univ., Phila.
Shannon, Albert		Mar. 12, '72	University of Penna., Phila.
Williams, William C		Mar. 8, '77	Hahneman Med. Col., Phila.
Wells, Joseph M		Mar. 12, '78	Jefferson College, Phila., Pa.
Wetherell, Horace G		Mar. 15, '78	University of Penna., Phila.
Young, Peter C	Ringoes	Mar. 13, '73	University of Penna., Phila.

MERCER COUNTY.

Brown, Charles C		Mar. 2, '59	College of Medicine, Phila.
Brock, Harry D		Mar. 20, '72	University of Penna., Phila.
Bodine, Joseph L		Mar. 10, '65	University of Penna., Phila.
Barwis, Elmer		Mar. 10, '73	University of Penna., Phila.
Bayles, John G		July 18, '47	Univ. of the City of N. Y.
Brigleb, William		Apr. 8, '41	Hessian Ludwig's Univ. of Giessen, Germany.
Burton, Jacob W		Mar. 10, '77	Univ. of the City of N. Y.
Baker, Elias C		Jan. 7, '53	Medical School of Yale Col.
Boardman, Joseph C		July 4, '51	Med. Soc. of New Jersey.
Bergen, Elston H		Mar. 1, '77	Col. of Med. and Surg., N. Y.
Bartine, Oliver H		Mar. 5, '49	Med. Col. of Penna., Phila.
Britton, Charles P		Mar. 10, '73	University of Penna., Phila.

MERCER COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Coleman, H. Waldburg...		Feb. 28, '68	Col. of Phys. and Surg., N. Y.
Cooper, Isaac		Mar. 4, '80	Hahneman Med Col., Phila.
Compton, Charles B.		Mar. 1, '54	Hahneman Med. Col., Phila.
Christine, William B.		Mar. 12, '77	University of Penna, Phila.
Clark, William A.		Mar. 14, '79	University of Penna., Phila.
Doud, Edward J.		Mar. 3, '80	Col. of Med. and Surg., Balt.
Dewitt, Edmund		Mar. 9, '62	Univ. of the City of N. Y.
Dey, Addison H.		Mar. 15, '81	University of Penna., Phila.
Davis, Irenaus S.		Mar. 1, '71	Bellevue Hosp. M. Col., N. Y.
Dunham, Charles H.		Mar. 12, '64	University of Penna., Phila.
Delaney, Alfred		——, '06	Mondingo Herb College.
Elmer, William		Oct. 7, '64	University of Penna., Phila.
Freese, Jacob R.		July —, '51	Phila. Med. College, Pa.
Franklin, George H.		Feb. 8, '74	Columbia Med. Col., N. Y.
Gerry, Charles W.		Oct. —, '78	University Boston, Mass.
Griffeth, W. H. G.			Hahneman Med. Col., Phila.
Green, William		Mar. 15, '60	University of Penna., Phila.
Gallagher, Patrick J.		Mar. 6, '78	State University of Iowa.
Hutchinson, Robert C.		Mar. 15, '78	University of Penna., Phila.
Hart, Israel		Mar. 4, '53	University of Penna., Phila.
Hart, Edgar		Mar. 14, '79	University of Penna., Phila.
Holman, H. R.		Mar. 16, '72	Col. of Hom. Med., N. Y.
James, Jacob B.		Apr. 30, —	Col. of Geneva, Switzerland.
Jackson, Moses J.		Jan. [illegible], '80	Eclectic Med. Col. of Penna.
Johnson, J. P.		Mar. 2, '67	Hom. Med. Col., Phila, Pa.
Kirk, Enos L.		Mar. 10, '80	Hahneman Med. Col., Phila.
Kirby, John		Apr. 3, '52	University of Penna., Phila.
Laning, J. T.		Jan. 21, '63	Col. of Medicine of Phila.
Lalor, William S.		Mar. 12, '72	University of Penna., Phila.
Lawrence, B. M.		Dec. 25, '65	N. Y. Therapeutic College.
Laning, Joseph S.		Feb. 21, '71	University of Buffalo, N. Y.
Lytle, William J.		Mar. 8, '48	Univ. of the City of N. Y.
Lewis, Smith H.		Mar. 15, '81	University of Penna., Phila.
Leavitt, Lyman		Mar. 6, '57	University of Penna., Phila.
Leavitt, Charles B.		Mar. 15, '82	University of Penna, Phila.
Lloyd, Henry C.		July 3, '48	University of Penna, Phila.
Maul, J. M.		July 3, '76	Phila. Electropathic Inst.
Miller, John A.		Feb. 22, '64	Eclectic Med. Col, Phila.
Mackenzie, Thomas H.		Mar. 8, '71	Harvard Med. School, Mass.
MacDonald, Arthur K.		Mar. 12, '75	University of Penna., Phila.
McCullough, William G.		Mar. 11, '78	Hahneman Med. Col., Phila.
Moke, J. A.		Mar. 9, '70	Hahneman Med. Col., Phila.
Nelson, Adonis			University of Penna., Phila.
Neil, Henry A. P.		Mar. 12, '77	University of Penna., Phila.
Newell, William A.		Mar. 12, '77	University of Penna., Phila.
Palmer, George M.		Mar. 4, '80	Eclectic Col. of New York.
Paul, Sarah E.		Mar. 13, '61	Female Med. Col. of Penna.
Phillips, W. W. L.		Mar. 8, '55	Jefferson College of Penna
Rue, Henry B.		Mar. 15, '80	University of Penna., Phila.
Reese, L.		Mar. 14, '82	Medico Surgical Col., Phila.
Rankin, Robert M.		Mar. —, '77	Univ. of the City of N. Y.
Rogers, Richard R.		Mar. 13, '62	University of Penna., Phila.
Rogers, Richard Runyan		Mar. 15, '82	University of Penna., Phila.
Rice, William		—— 15, '60	University of Penna., Phila.
Rhinehart, T. F. A.		——, '49	Wurtzburg College, Germany.
Ribble, J. I. B.		Mar. 3, '54	Col. of Phys. and Surg., N. Y.

MERCER COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Robbins, George R.		Mar. 12, '70	Jefferson Med Col., Phila
Shafer, Herman		Mar. 13, '69	University of Penna., Phila.
Skellenger, Edward B.		Mar. 1, '75	Col of Phys. and Surg., N. Y.
Stokes, Alfred C		Mar. 13, '69	University of Penna., Phila.
Shepherd, Cornelius		Mar. 15, '61	University of Penna., Phila
Sackett, Edward W.		Mar. 14, '82	Hahneman Med. Col., Phila.
Steen, Alexander M.		Mar. 15, '82	University of Penna, Phila.
Struble, Hugo Mc		Mar. 12, '75	University of Penna., Phila.
Satterthwaite, Joseph H.		Mar. 13, '83	Hahneman Med. Col., Phila.
Schenck, J. Stillwell		Mar. 31, '43	University of Penna., Phila.
Titus, George E.		Aug. 1, '77	Bellevue Medical College.
Tantum, James D.		Mar. 15, '78	University of Penna., Phila.
Taylor, Sewell O. B.		Mar. 12, '72	University of Penna., Phila.
Turner, Joseph		Mar. 12, '78	Jefferson College, Phila
Van Duyn, William B.		Mar. 12, '66	Univ. of City of New York.
Wikoff, J. H.		Mar. 4, '54	Univ. of City of New York.
Welling, E. Livingston		Mar. 15, '60	University of Penna., Phila.
Wyckoff, W. W.		May 14, '64	Eclectic Med. Col. of Phila.
Williams, Frank H.		Mar. 12, '74	University of Penna., Phila.
Ward, John W.		Mar. 14, '66	University of Penna, Phila
Williamson, Alexander		Mar. 25, '78	University of Penna., Phila.
Weeks, Henry M.		Mar. 10, '73	University City of N. Y.
Woolverton, John		Apr. 7, '49	University of Penna. Phila.
Warman, David		Mar. 10, '62	Bellevue Med Col., N. Y.
Wilbur, Lloyd		Mar. 11, '54	Jefferson Med. Col., Phila.
Worthington, Anthony		Mar. 1, '60	Penna. Hom. Med. College.
Wilson, William V.		July 11, '67	Yale Med. School, Conn.
Young, James R.		Mar. 13, '83	University of Penna., Phila.

MIDDLESEX COUNTY.

Andrus, C. H.	Metuchen	Mar. 6, '45	Col. Phys. and Surg., N. Y.
Baldwin, Henry R.	New Brunswick	Mar. 4, '53	Col. Phys. and Surg., N Y.
Barber, Edmund H.	New Brunswick	Mar. 8, '77	Hom. Med. College, N. Y.
Blackwell, Lewis S.	Perth Amboy	Mar. 8, '57	University of Pennsylvania.
Bissett, Frederick W.	Washington	Mar. 1, '76	Col. Phys. and Surg., N. Y.
Bissett, John J.	Washington	Mar. 12, '80	Col. Phys. and Surg., N. Y.
Baldwin, J. M.	Dayton	Mar. 13, '80	Jefferson Med. Col., Penna.
Bertolet, E. B.		Mar. 10, '76	University of Pennsylvania.
Barchet, Stephen P.	China	Mar. 4, '75	N. Y. Col. of Homœopathy.
Berhans, W. M.		Feb. 18, '75	University of Pennsylvania.
Bates, Cornelius S.		Jan. 3, '81	Eclectic Med. Col. of Penna.
Barber, Adelia B.	New Brunswick	Apr. 3, '83	N. Y. Female Med. Academy.
Clark, Staats V. D	New Brunswick	Mar. 2, '70	Col. of Phys. and Surg., N. Y.
Clark, George G	New Brunswick	July 8, '79	Univ. of the City of N. Y.
Carman, J. H	South Amboy	Mar. 1, '81	Col. Phys. and Surg., Balt.
Disbrow, Stephen M.	Old Bridge	Mar. —, '77	Bellevue Medical College.
Decker, Dayton E.	Woodbridge	Jan. 15, '74	Long Is. College Hospital.
Donahue, Francis M.	New Brunswick	Mar. 8, '81	Univ. of the City of N. Y.
English, David C.	New Brunswick	Feb. 28, '68	Col. of Phys. and Surg., N. Y.
Everitt Edward	Woodbridge	Mar. —, '79	Hom. Med College, N. Y.
Fuchs, Maria	Milltown	May 1, '50	Heidelberg College.
Freeman, Alonzo	South Amboy	Mar. 1, '69	Col. of Phys. and Surg., N. Y.
Follett, William M.	New Brunswick	Mar. 1, '83	Eclectic Med. College, N. Y.

MIDDLESEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Geis, Rosalie	Woodbridge	May 31, '72	Royal School for Midwives, Weizburg, Bavaria
Garner, Henry B.	Spotswood	Mar. 1, '76	Col. of Phys. and Surg., N. Y.
Howard, Thomas T., Jr.	South Amboy	Mar. 5, '80	Hom. Med. College, N. Y.
Helm, John, Jr.	New Brunswick	July 11, '60	Univ. of the City of N. Y.
Hunt, Ezra M.	Trenton	Mar. 4, '52	Col. of Phys. and Surg. N. Y.
Hubbard William H.	Perth Amboy	Mar. —, '73	Bellevue Med. College.
Haight, Alfred M.		Mar. 7, '79	Hom. Med. College, N. Y.
Holmes, John C.	Cranbury	Mar. 10, '64	Col. of Phys. and Surg., N. Y.
Hamilton, Ezra W.		Mar. 3, '81	Hom. Med. College, N. Y.
Hunt, Alonzo C.	Metuchen	Mar. 13, '81	Col. of Phys. and Surg., N. Y.
Janeway, George J.	New Brunswick	Oct. 4, '39	Med. Soc. of New Jersey.
Keep, Caroline J.	Middlebush	Mar. 1, '67	Hom. Med. College, N. Y.
King, Joseph H.		June 25, '67	Eclectic Med. Col. of Penna.
King, Joseph H.		June 10, '71	American Univ. of Phila.
Long, Samuel	New Brunswick	Mar. 10, '73	Hahneman Med. Col., Phila.
Lawrence, B. M.		Dec. 25, '65	Hygei's Thera Col., N. Y.
Lewis, William C., Jr.	South Amboy	Mar. 5, '80	University of Pennsylvania.
Morgan, Lawrence O.	South Amboy	Mar. 9, '65	Col. of Phys. and Surg., N. Y.
Mabon, William	New Brunswick	Mar. 1, '81	Bellevue Med. Col., N. Y.
Norton, Horace G.		Mar. 15, '80	University of Pennsylvania.
Nelson, William J.	Dunellen	Mar. 12, '80	Col. of Phys. and Surg., N. Y.
Norton, Frank B.	Metuchen	Mar. 13, '74	Univ. of the City of N. Y.
Platt, Joseph H.	Dunellen	Mar. 1, '56	Penna. Hom. Med. College.
Rice, J. Warren	New Brunswick	Mar. 1, '75	Col. of Phys. and Surg., N. Y.
Reiley, Edward A.	Atlantic City.	Mar. 8, '81	Univ. of the City of N. Y.
Reed, Rufus	New Brunswick	Mar. 10, —	Hahneman Med. Col., Phila.
Stephens, David	New Brunswick	Nov. 24, '63	Berkshire Med. Col., Mass.
Skillman, Thomas A.	Quakertown	Mar. 11, '78	Univ. of the City of N. Y.
Slack, Clarence M.	New Brunswick	Mar. 10, '65	Jefferson Med. Col., Penna.
Sleeper, Thomas D.	Camden	June 6, '70	Eclectic Med. College, Penna.
Symmes, Henry C.	Cranbury	Mar. 14, '80	University of Pennsylvania.
Smith, John F.		Mar. 6, '67	Georgetown College.
Suydam, John L.	Jamesburg	Mar. 9, '82	Univ. of the City of N. Y.
Thompson, John C.	Washington	Mar. 6, '56	Col Phys. and Surg., N. Y.
Treganowan, Ambrose	South Amboy	July 1, '54	Phila. College of Medicine.
Vail, Duncan P.	Dunellen	June 2, '53	Vermont Medical College.
Van Marter John S.	New Brunswick	Feb 21, '66	Med. and Surg Univ. of Pa.
Voorhees, Charles H.	New Brunswick	Mar. 9, '50	Jefferson Med Col. of Penna.
Verdi, Ciro S.	New Brunswick	Feb. 28, '61	N. Y. Col. of Homœopathy
Van Deventer, John L.	New Brunswick	May 13, '81	Col. of Phys and Surg., N. Y.
Wainwright, J. B.	Milltown	Mar. 1, '77	Col. of Phys and Surg, N. Y.
Wilson, J. G.	Perth Amboy	Mar. 10, '76	University of Pennsylvania.
Williamson, Nicholas	New Brunswick	Mar. 9, '71	Univ. of the City of N. Y.
Walton, Alfred	South Amboy	June 25, '79	Harvard University.
White, J. Leon	South Amboy	Mar. 12, '81	Jefferson Med College, Pa.
Wilson, G. V.	Monmouth Junc'n	July 18, '67	Yale College.
Zandt, H. D.	Jamesburg	Mar. 14, '81	University of Pennsylvania.

MONMOUTH COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Alday, John H.	Ocean Grove	Mar. 1, '56	Col. Med. Hom., Phila., Pa.
Applegate, Asher T.	Englishtown	Mar. 13, '69	University of Penna., Phila.
Arrowsmith, Joseph E.	Keyport	Mar. —, '42	University of City of N. Y.
Archer, Hannah E.		Feb. 4, '60	Eclectic, New York.
Archer, William		Feb. 4, '60	Eclectic, New York.
Allen, Charles W.		Mar. 1, '78	Columbia College, N. Y.
Alba, F. T.		July 9, '46	Norwich University, now Lewis College.
Alday, Henry B.	Ocean Grove	June 15, '82	University of Penna., Phila.
Amony, Joseph D.		Mar. 1, '75	Columbia College, N. Y.
Beegle, I. Newton F.	Ocean Grove	Mar. 1, '70	Col. of Med. Bellevue Hosp.
Burhans, Laura M.		Feb. 19, '75	University of Med., Phila.
Burnett, William W.	Freehold	Mar. 1, '70	College Med. Hom., N. Y.
Bailey, Thomas H.		Mar. 1, '70	Col. of Med. Bellevue Hosp.
Brown, George W.		Feb. 28, '79	Columbia College, N. Y.
Buchanan, Alexander		July 10, '60	Med. and Surg., Glasgow.
Bennett, Henry Hudson		Mar. 13, '81	Columbia College, N. Y.
Beach, William B.	Eatontown	Mar. 1, '75	Univ. of Maryland Med. Col.
Beck, J. Howard		Mar. 15, '82	University of Penna., Phila.
Bissett, John J.		Mar. 12, '80	Columbia College, N. Y.
Burnett, D. Walton		Mar. 4, '83	College Med. Hom., N. Y.
Chittenden, Daniel J.	Fair Haven	Mar. —, '59	Univ. City of New York.
Cheesman, Joseph K.	Red Bank	June 13, '43	Onondaga Soc. State of N. Y.
Crater, Elias Wolcott	Oceanport	Mar. 1, '78	Columbia College, N. Y.
Chattle, Thos. G.	Long Branch	July 1, '54	Phila. Col. Med. State of Pa.
Clark, Isaac J.		Mar. 9, '58	Jefferson College, Phila., Pa.
Cook, Henry G.	Holmdel	Mar. 5, '57	Col. Med. and Surg., N. Y.
Curry, George H.		Mar. 10, '80	Hahneman Med. Col., Phila.
Costell, Henry B.	Rocky Hill	Mar. 15, '82	University of Pennsylvania.
Coe, Henry Clark		Mar. 16, '82	Columbia College, N. Y.
Conover, Robert R.	Red Bank	Mar. 6, '47	University of City of N. Y.
Conover, James T.	Freehold	Mar. 1, '57	Col. of Med. Bellevue Hosp.
Chasey, Jacob	Long Branch	Mar. 1, '75	Columbia College, N. Y.
Desbrin, Vanderhoof M.	Farmingdale	July —, '80	Col. of Ag. Univ. of Vermont.
Davison, J. Franklin		——, '80	Univ. City of New York.
Des Angeles, Henry F.	Asbury Park	Jan. 4, '64	Med. Soc. of New Jersey.
Davis, Josephine G.		Mar. 15, '77	College of Medicine, Penna.
Desbrin, F. A.	Farmingdale	Mar. 1, '81	Col. of Med. and Surg., Md.
Dearborn, Henry M.		July 15, '69	Bowdoin College, Maine.
Duryee, Charles C.		Mar. 4, '81	Albany Medical College.
Davis, Edwin T.		Mar. 14, '82	Hahneman Med. Col., Phila.
Dessau, T. Henry		Mar. 7, '68	Jefferson College, Penna.
Ellison, Ozias		Mar. 4, '80	U. S. Medical College.
Evans, Mariam D. L.	Asbury Park	Mar. 1, '82	Eclectic Med. College, N. Y.
Evans, Samuel D.	Asbury Park	Mar. 1, '82	Eclectic Med. College, N. Y.
Field, Edwin	Red Bank	Feb. 27, '73	Columbia College, N. Y.
Forman, D. McLean	Freehold	Mar. 8, '66	Columbia College, N. Y.
Fay, George D.		Mar. 10, '81	Hahneman Med. Col., Phila.
Garrison, Henry W.	Asbury Park	Feb. 28, '78	College Med. Hom., N. Y.
Goodenough, Josephus B.	Long Branch	Mar. 4, '52	College of Med., City of N. Y.
Gardiner, Richard, Jr.		Dec. 6, '80	Hahneman Med. Col., Phila.
Green, James O.	Long Branch	Mar. 1, '66	Col. of Med. Bellevue Hosp.
Hetrick, Jacobus A. W.	Asbury Park	Mar. 9, '76	Hahneman Med. Col., Phila.
Howell, Alexander A.	Allentown	Mar. 1, '41	Jefferson Med. Col., Phila.
Hustis, C.	Ocean Grove	Mar. 5, '65	Univ. City of New York.
Hickson, Charles S.		Feb. 21, '50	Medical Col., Syracuse, N. Y.

MONMOUTH COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Humphreys, Frederick...	....	Mar. 2, '50	Col. Med. Hom., Phila., Pa.
Hendrickson. Daniel D...	Middletown.........	Mar. 15, '80	University of Pennsylvania.
Hunt, Sylvester H.........	Long Branch......	Mar. 10, '65	Jefferson Col. of Penna.
Hills Arthur T.............	....	Mar. 4, '75	College Med. Hom., N. Y.
Hunter, Jacobus B.........	....	Mar. 8, '66	Columbia College, N. Y.
Hughes, Henry.............	Long Branch......	Feb. 27, '73	Columbia College, N. Y.
Hodgson, Wilmer..........	....	Mar. 5, '67	College, Richmond, Va.
Hubbard, William H......	Red Bank...........	Aug. 1, '34	Med. Soc. of New Jersey.
Herbert, Ralph Willis.....	....	Mar. 3, '81	N. Y. Medical College Hom.
Hutchinson, George H...	Englishtown.......	Mar. 15, '80	University of Pennsylvania.
Hanks, Horace T...........	....	Dec. 23, '61	Albany Medical College.
Henry, Nelson H...........	....	Feb. 28, '79	Columbia College, N. Y.
Ingham, Harvey Alanson	....	Feb. 28, '82	Ec. Med. Col. City of N. Y.
Jones, Mariam A. D.......	....	Mar. 11, '75	College of Medicine, Penna.
Jackson, Andrew...........	Matawan............	Feb. 25, '73	University of Buffalo, N. Y.
Janeway, Edward G......	....	Mar. 10, '64	Columbia College, N. Y.
James, Jacobus B..........	....	Apr. —, '29	Geneva College, N. Y.
Janney, Thomsin...........	....	Apr. 9, '77	Medical Academy, N. Y.
Judson, Edward Allen....	....	July —, '79	Univ. City of New York.
Johnson, Harris P.........	Allentown..........	Apr. 2, '83	Jefferson College of Penna.
Karsner, Charles...........	....	Mar. 15, '59	Jefferson Med. Col., Phila.
Kinmouth, William R.....	Farmingdale........	Feb. 12, '72	Columbia College, N. Y.
Kimball, Walter S.........	Eatontown..........	Mar. 4, '63	College Med. Hom., N. Y.
Kinmouth, William R. S.	Manasquan.........	Mar. 25, '79	American University, Phila.
Kinmouth, Hugh S........	Asbury Park.......	Mar. 2, '70	Columbia College, N. Y.
Kimball, Revel B..........	Seabright............	Mar. 12, '80	Columbia College, N. Y.
Kinmouth, William L....	....	Mar. —, '81	U. S. Med. College, N. Y.
Kennedy, Robert...........	....	Mar. 10, '81	Hahneman Medical College.
Keator, Bruce S............	Asbury Park.......	Mar. 3, '81	College Med. Hom., N. Y.
Karsner, Charles W.......	....	Mar. 12, '78	Jefferson Col. of Pa., Phila.
Karsner, Charles W.......	....	Mar. 10, '75	Hahneman Med. Col., Phila.
La Baw, David.............	Navesink...........	Mar. 12, '80	Columbia College, N. Y.
Long, Isaac S..............	Freehold............	Mar. 14, '66	University of Pennsylvania.
Lewis, Smith Haines......	....	Mar. 14, '81	University of Pennsylvania.
Mitchell, Henry...........	Asbury Park......	Oct. 1, '66	M. Col. Bellevue Hosp., N. Y.
Marsden, George F........	Red Bank...........	Mar. 1, '66	Col. Med. Hom., Phila., Pa.
Mackenzie, C...............	....	Feb. 21, '60	College of East Hudson, O.
Mackintosh, Sarah F......	....	Oct. 1, '72	Col Med. Fem. Hosp., N. Y.
Marren, Rosemond W.....	....	Mar. 1, '78	Col. M. Bellevue Hosp., N. Y.
Morgan, John C............	....	Mar. 5, '52	Medical College of Penna.
Moore, Charles H..........	....	Feb. 27, '73	Columbia College. N. Y.
Mosely, Nathaniel R......	....	Mar. 6, '49	Col. of Med., Phila., Pa.
Morton, Francis Knox...	....	Mar. 7, '82	Jefferson Col. of Pa., Phila.
Merriman, Elisha Smith.	....	Mar. 27, '56	University of Michigan.
Neafie, Harry...............	Turkey..............	Apr. 1, '80	Col. M. Bellevue Hosp., N. Y.
Norton, Horace Greeley..	Imlaystown.........	Mar. 15, '80	University of Pennsylvania.
Nobles, Milton A..........	....	June 9, '81	Col. of Med. and Surg., N. Y.
Ostrom, H. I...............	....	Mar. 3, '73	Hom. College Med., N. Y.
Offenbach, Robert.........	....	Feb. 17, '79	University City of N. Y.
Odell, Frank M............	....	Mar. —, '75	University City of N. Y.
Palmer George M.........	....	Mar. 4, '80	Eclectic Col Med., N. Y.
Pemberton, Harry H......	Long Branch.......	Mar. 9, '72	Jefferson College of Penna.
Parrish, Joseph............	....	Apr. 4, '44	University of Pennsylvania.
Pemberton, John B........	....	Mar. 12, '64	Columbia College, N. Y.
Patterson, William F......	....	Dec. 23, '75	Albany Medical College.
Pomeroy, Mary A. G......	....	Mar. 3, '70	Boston University, Mass.

MONMOUTH COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Pemberton, Charles	Asbury Park	Mar. 9, '82	Jefferson College of Penna.
Pierson, Samuel		Mar. 13, '81	Columbia College, N. Y.
Ridgeway, Thomas E	Red Bank	Mar. 10, '64	Jefferson College of Penna.
Rogers, Ricardum R		Mar. 30, '62	University of Pennsylvania.
Rhodes, Robert D	Keyport	Feb. 28, '56	Western Hom. Col., Cleve., O.
Roth, Edward		Mar. 1, '80	Col. Med. Bellevue Hosp.
Rockwell, Philomen G		July 2, '46	Berkshire School Med., Mass.
Roberts, Daniel E	Keyport	Mar. 3, '83	University of City of N. Y.
Rhein, Meyer L		Mar. 5, '80	Albany Medical College.
Robinson, George F		Mar. 12, '81	Jefferson Medical Col., Phila.
Swan, Benjamin I		Mar. 1, '70	Bellevue Medical Col., N. Y.
Sanders, C. Walton		Mar. 1, '78	Columbia College, N. Y.
Still, Emma R		May 23, '57	Ecl Col. Med, Cincinnati. O.
Shaw, E. D		Mar.—, '80	University of City of N. Y.
Smith, Andrew H		Oct. 4, '80	Col. Med. Surg. City of N. Y.
Starks, W. H. L		June 9, '53	Col. Med., Castleton, Vt.
Seward, Benjamin I		Mar. 1, '70	Col. M. Bellevue Hosp., N. Y.
Stryker, Edward V		Sept. 12, '72	Col. Medicine, Albany, N Y.
Street, David Reese		Mar. 15, '80	University of Pennsylvania.
Simmons, Charles E		Mar. 10, '64	Columbia College, N Y.
Smith, Charles S		Mar. 12, '79	Jefferson College of Penna.
Sayrs, Jeremiah E		Apr. 2, '83	Jefferson College of Penna.
Sackett, Edgar Wayne		Mar. 14, '82	Hahneman Med. Col., Phila
Trafford, Alfred F	Red Bank	Mar. 8, '77	Hahneman Med. Col., Phila.
Trask, Frederick M		June 1, '75	Bellevue Col Med, N. Y.
Tusting, Robert	Asbury Park	Jan. 22, '62	Eclec. Col. Med., Phila., Pa.
Tantum, J. R	Ocean Grove	Mar. 4, '65	Col. Med. Hom., Phila., Pa.
Taylor, Edward F	Middletown	Apr. 9, '53	University of Pennsylvania.
Thropp, Augustus P		Mar. 4, '62	Col. Med. Hom., N Y.
Thirrcelin, Eticune H		June 1, '40	Un. of France, Acad. of Paris.
Todd, Alphonso R		Mar. 13, '80	Jefferson College of Penna
Vandyke, C. D. W	Perrinsville		Albany Med. College. N. Y.
Van Mater, I. H	Atlantic Highl'ds	Mar. 15, '80	University of Pennsylvania.
Vanderbeck, Cornelius C		Mar. 9, '72	Jefferson College of Penna.
Wildes, Thomas		Mar. 2, '76	Col. Med. Hom., N. Y.
Welch, George T	Keyport	Mar. 13, '68	University of Pennsylvania.
Woolley, George W		Mar. 1, '36	Ohio College of Medicine.
Watkins, William B		Mar. 1, '79	Bellevue Hosp Col. M., N. Y.
Williams, J. A		Jan. 27, '64	Rush Medical College, Ill.
Wilber, George F. F		Mar. 15, '82	University of Pennsylvania.
Warner, G. Bray		Mar. 9, '82	University of City of N. Y.
Youlin, I. I		Mar. 1, '54	Col. Med. Hom., Cleve, O.
Yelvington, Alfred Pearce		Feb. 26, '80	Eclec Med. Col. City of N. Y.
Yelvington, Charles H		Feb. 24, '81	Eclec. Med. Col City of N. Y.

MORRIS COUNTY.

Anderson, Calvin		Mar. 9, '65	Columbia College, N. Y.
Andrews, H. B	Morristown	Nov. 11, '78	New York City University.
Barker, Phanett C	Morristown	Mar. 1, '60	University of State of N. Y.
Buttolph, H. A	Morris Plains	Dec. 2, '35	Williams College, Mass.
Becker, G. A	Whippany	——, '80	Columbia College, N. Y.
Byram, John	Mine Hill	Mar.—, '81	Baltimore College.
Booth, A. C		June 27, '77	Harvard University, Mass.

MORRIS COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Cooper, E. P	Parsippany	Feb. 20, '71	New York University
Case, Levi W		Mar. 12, '80	Columbia College N. Y.
Carpenter, A. E	Boonton	May 12, '74	Pennsylvania University.
Condict, Arthur W	Dover	June —, '82	Michigan University.
Condict, Isaiah W	Dover	May 11, '47	Med. Soc of New Jersey.
DeHart, John N	Madison	June 21, '65	New York University.
Derry, W. E	Dover	——, '80	Columbia College, N. Y.
Douglass, James	Morristown	Mar. 13, '80	New York University.
De Groot, George		——, '80	Columbia College, N. Y.
Day, Harry V		July 11, '76	New York University.
Dreher, George W	Bloomingdale	——, '23	Jefferson College of Penna.
Farrow, Levi		Mar. 9, '65	Columbia College, N. Y.
Flagler, Thomas B		June 13, '54	Albany Med. College, N. Y.
Fonda, Edward S		Mar. 5, '79	U. S. Med. Col. of N. Y.
Ford, Mary C	Dover	Mar. 31, '75	Female College, N Y.
Glenn, Irenaeus R		Mar. 12, '64	University of Pennsylvania.
Hulshizer, Henry	Port Oram	Feb. 28, '56	Philadelphia Col. of Penna.
Hunter, John M		——, '54	New York University.
Hedges, Smith E	Chester	Mar. 6, '52	New York University.
Hoffman, Joseph	Morristown	Mar. 15, '83	Hom. Med. College of N. Y.
Hann, P. S	German Valley	Mar. 15, '83	Hom. Med. College of N. Y.
Iliff, Elias P		June 21, '77	Long Island Col. Hosp.
King, Joseph D	Dover	June 26, '67	Long Island Col. Hosp.
Lindsley, James C		Mar. 1, '69	Columbia College, N. Y.
Lewis, A. A		——, '68	University of New York.
Lloyd, T. M		——, '76	University of Pennsylvania.
Lumsden, R. C	Rockaway	——, '81	Columbia College, N. Y.
Lawrence, B. M		Dec. 25, '65	Hygieo Thera. College, N. Y.
Macwithey, A. A		Nov. 20, '53	University of New York.
Owen, Frederick W	Morristown	Mar. 5, '57	Georgetown College.
Platt, Joseph H		——, '56	Med. Hom. College Penna.
Pierson, Samuel	Morristown	——, '81	Columbia College, N. Y.
Pierson, Stephen		Mar. 1, '69	Columbia College, N. Y.
Ryerson, John G	Boonton	Mar. 4, '59	New York University.
Romondt, C. D. V		Feb. 22, '72	Columbia College, N. Y.
Rossi, E	Dover	May 4, '36	University of France.
Stiger, J. Henry	Mendham	Mar. 4, '57	New York University.
Stiger, John S	Mendham	Mar. 17, '50	New York University.
Swan, Charles Y	Morristown	Jan. 22, '56	New York University.
Swain, George M		——, '70	Columbia College, N. Y.
Smith, Edwin E		June 22, '71	Long Island Col. Hosp.
Webelacker, Armin	Morristown	Mar. 6, '71	Hom. Med. Col. of N. Y.
Wadsworth, Sarah J		Apr. 5, '76	N.Y. Free M. Col. for Women.
Wiggins, Henry C		Jan. 22, '74	Albany College, N. Y.
Wood, J. Walter		Mar. 30, '81	Columbia College. N. Y.
Wigg. Cuthbert	Boonton	Mar. 1, '80	Bellevue Hosp. Med. Col.

OCEAN COUNTY.

Ashhurst, Samuel	Beach Haven	——, '61	University of Pennsylvania.
Bean, J. M	New Egypt	Apr. 1, '54	University of Pennsylvania.
Blake, I. A. D	Manchester	——, '61	Med. Univ. of Phila., Pa.
Buckingham, F. S	Lakewood	Mar. 1, '71	Columbia College, N. Y.
Burnett, J. P	Island Heights	Mar. 11, '65	University of Pennsylvania.

OCEAN COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Clayton, Wm. G	Metedeconk	Mar. 15, '82	Bellevue Hosp. Med. Col
Cobb, B. S	Waretown	Feb. 20, '51	Cen. M. Col., Rochester, N. Y.
Disbrow, E. Clarence, Jr.	Toms River	——, '81	Surg. and Phys. Col., N. Y.
Disbrow, Rem. L	Toms River	——, '62	Columbia College, N. Y.
Gordon, Chas. O	Lakewood	Oct. 24, '67	Dartmouth College.
Hill, Mary H	Manchester	Sept. —, '63	Med. Univ. of Phila., Pa.
Irwin, Samuel B	Island Heights	——, '55	Jefferson College.
Kenyon, Marcum	Forked River	——, '83	Columbia College, N. Y.
Mattison, J. B		——, '67	Bellevue Hosp. Med. Col.
Mixsell, Joseph	Manchester		University of Pennsylvania.
Reed, H. W	Manchester	June 20, '73	American University, Phila.
Tunis, Geo. S	Metedeconk	——, '69	Bellevue Hosp. Med. Col.
Warren, A. D	New Egypt	Feb. 22, '47	Botanic Med. Col. of Ohio.
Webb, John W	Toms River	——, '64	Jefferson Med. College, Phila.
Youngman, Maurice	Manchester	Mar. 5, '80	N. Y. Hom. Col. of Medicine.

PASSAIC COUNTY.

Amiraur, James C	Paterson	June 26, '72	Long Island Hosp. College.
Archer, Charles H	West Milford	May 6, '67	Eclectic M. Col. of Med., N. Y.
Ayres, Morgan W		Mar. 1, '75	Col. Phys. and Surg., N. Y.
Bibby, James S	Paterson	Mar. 1, '75	Bellevue Hosp. Med. Col.
Barden, L. H	Paterson	Feb. 15, '72	Eclectic Med. Col., N. Y.
Blackwell, Enos T	Paterson	June 14, '48 Mar. 13, '69	Vermont Med. College. University of Pennsylvania.
Balleray, George H	Paterson	Mar. 1, '69	Col. Phys. and Surg., N. Y.
Banta, John H	Paterson	June 1, '79	Bellevue Hosp. Med. Col.
Borden, Davis P	Paterson	Feb. 19, '73	Eclectic Med. Col. of N. Y.
Busse, William	Paterson	Feb. 28, '72	Col. Phys. and Surg., N. Y.
Blundell, William	Paterson	Mar. 24, '61	Col. Phys. and Surg, N. Y.
Bradsworth, John H	Paterson	Mar. 3, '81	N. Y. Homœopathic Med. Col.
Coursen, Whitfield S	Oak Ridge	Mar. 1, '48	Col. of Phys. and Surg., N. Y.
Coursen, Theodore D	Oak Ridge	Mar. 1, '8(	Bellevue Hosp. Med. Col.
Carr, Ada	Paterson	Mar. 28, '82	N. Y. Woman's Med. Col.
Collins, James W	Passaic	Mar. 5, '63	Bellevue Hosp. Med. Col.
Church, Charles A		Mar. 6, '71	N. Y. Hom. Med. College.
Campbell, George		Mar. 9, '82	Univ. of the City of N. Y.
Day, Harry V		July 1, '76	Univ. of the City of N. Y.
Dewey, Raphael P		June 20, '70	Eclectic Med. College, Phila.
Delatour, Arthur	Paterson	Mar. 8, '82	United States Med. Col.
Decker, William F	Paterson	Mar. 2, '76	N. Y. Hom. Med. Col.
De Yeo, Charles P		Mar. 15, —	Maryland Academy, Balt.
Ferleman, L. M. B,		Nov. 3, '80	Middleburgh M.Sch., Zealand.
Furbeck, Henry L	Little Falls	Mar. 4, '81	Albany Medical College.
Friedrich, Gustav L	Paterson	Dec. 22, '52	University of Berlin, Prussia.
Garnett, O. V	Paterson	Mar. 10, '55	Jefferson College, Phila.
Gedney, Jacob M. R	Little Falls	Mar. 1, '69	N. Y. Homœopathic Med. Col.
Gillson, Michael W	Paterson	Mar. 1, '81	New York University.
Hengeler, Jacob	Paterson	Mar. 5, '57	N. Y. Med. College.
Harris, Philander A	Paterson	Mar. 27, '72	University of Michigan.
		Feb. 27, '73	Col. of Phys. and Surg., N. Y.
Herrick, John C	Passaic	June 29, '69	Long Island Col. Hosp.
Howe, John M	Passaic	June 19, '44	Castleton Med. Col., Vermont.
Hepworth, Frederick J	Paterson	June 14, '81	Long Island Hosp. Col.

PASSAIC COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Hill, William Dudley......	Paterson............	July 6, '69	Vt. Univ. and Agric. Col.
Hurd, William S...........	Paterson...........	Mar. 10, '77	New York University.
Holman, Henry R	....	Mar. 7, '71	Kans. City Col. Phys. & Surg.
Johnson, Walter B......	Paterson............	Mar. 1, '78	Col. of Phys. and Surg., N. Y.
Kent William..............	Paterson............	June 26, '73	Long Island Hosp. Col
Kopschina, Theodore.......	Paterson............	Jan. 2, '77	Bd. of Exam., Griefwald, Ger.
Kip, Henry...................	Paterson............	Mar. 1, '77	Col. of Phys. and Surg., N. Y.
Kane, Thomas J...........	Paterson............	June 26, '72	Long Island Hosp. Col.
Kehrer, Augustus B.......	....	Mar. 15, '80	Hahneman Med Col., Phila.
Keeler, Edgar A...........	Little Falls.........	Mar. 3, '80	Maryland Col. Phys. & Surg.
Kinne, Porter S............	Paterson............	Mar. —, '72	N. Y. Hom. Med. Col.
Kinne, Theodore Y........	Paterson............	Dec. 23, '62	Albany Medical College.
Kinne, E. Alin.............	Paterson............	June 27, '78	Michigan University.
Knowles, Rollin H.........	Paterson............	Feb. 25, '81	Starling Med. Col., Col., O.
King, Joseph H............	Paterson..........	June 10, '71 June 25, '69	American Univ. of Phila. Penna. Eclectic Med. Col.
Liggett, Samuel J..........	Passaic.............	Mar. 12, '28	Jefferson College, Phila., Pa.
Lawrence, B. M............	....	Dec. 25, '65	N. Y. Hygieo Thera. Col.
Lindenhovins, F. H........	Paterson............	July 28, '73	Utrecht.
Leal, John L...............	Paterson............	Oct. 2, '83	Col. of Phys. and Surg., N. Y.
Maines, Robert G..	West Milford.......	Mar. 10, '63	Jefferson Med. Col., Phila.
Myers, Charles F. W......	Paterson............	Mar. 3, '74	Col. of Phys. and Surg., N. Y.
Moorehouse, Elias W......	Paterson............	Mar. 9, '82	N. Y. Univ. Med. Col.
Marsh, Elias J.............	Paterson............	Mar. 8, '58	Col. of Phys. and Surg., N. Y.
Mackintosh, James H......	Paterson............	Mar. 1, '72	Bellevue Hosp. Med. Col.
Mackintosh, Sarah F......	Paterson............	Oct. 1, '72	N. Y. Hp. M. Col. for Women.
Merrill, J. Randolph......	Paterson............	Mar. 11, '54	Jefferson College, Phila., Pa.
Montague, Harriet.........	Paterson............	June 4, '74	N. Y. Med. Col. for Women.
Maginnis, Bryan Charles	Paterson............	Mar. 3, '83	Univ. of the City of N. Y.
Neer, Rush.................	Paterson............	June 23, '80	Long Island College Hosp.
Newton, William K.......	Paterson............	Mar. 1, '78	Col. of Phys. and Surg., N. Y.
Newcomb, George F.......	Paterson............	Mar. 1, '77	Col. of Phys. and Surg., N. Y.
O'Grady, Thomas F.......	Paterson............	Mar. 1, '80	Bellevue Hosp. Med. Col.
Ossa, Luis F..............	....	Feb. 4, '76	Washingtonian M. U., Balt.
Paxton, John P............	Paterson............	June 26, '72	Long Island Hosp. Col.
Parke, Henry..............	Paterson............	Mar. 1, '82	Col. of Phys. and Surg., N. Y.
Quin, John.................	Paterson............	May 16, '50	Med. Society of New Jersey.
Rogers, Alexander W......	Paterson............	Mar. 29, '36	Col. of Phys. and Surg., N. Y.
....	....	Apr. 23, '45	Med. Soc. of New Jersey.
Ricardo, Norton C.........	Passaic.............	Mar. 1, '69	Hom. Med. College, N. Y.
Rice, Frank H............	Passaic.............	June 21, '54	Vermont State Med. School.
Russell, William H., Jr....	....	Mar. 10, '77	Univ. of the City of N. Y.
Stewart, James M.........	Paterson............	Mar. 13, '80	Jefferson Med. Col., Phila.
Solatinow, Joseph..........	Paterson............	Mar. 1, '82	Eclectic Med. Col., N. Y.
Smith, James William......	Paterson.	Mar. 15, '82	Bellevue Hosp. Med Col.
Silver, George A...........	Bloomingdale	Mar. 8, '81	New York University.
Searls, Wellington B......	....	Feb. 28, '72	Col of Phys and Surg., N. Y.
Schrebinzuber, Anthony..	....	Mar. 12, '70	University of Graecus, Styria.
Seward, Benjamin S.	....	Mar. 1, '70	Bellevue Hosp. Med. Col.
Terriberry, George W......	Paterson............	Mar. 1, '66	Bellevue Hosp. M. Col., N. Y.
Terriberry, Calvin.........	Paterson............	Oct. 1, '72	Bellevue Hosp. M. Col., N. Y.
Terhune, Richard A.......	Passaic.............	Mar. 8, '50	Col. of Phys. and Surg., N. Y.
Terhune Garret............	Passaic.............	June 21, '34	N. J. State Medical Society.
Townsend, Samuel C.....	Paterson	Mar. 1, '79	Bellevue Hosp. Med. Col.
Van Dalsen, Spencer......	Paterson............	Mar. 3, '76	Col. of Phys. and Surg., N. Y.
Van Giesen, Henry C.......	Paterson............	Feb. 8, '66	Col. of Phys. and Surg., N. Y.

PASSAIC COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Vreeland, Frank D	Paterson	Mar. 12, '79	N. Y. Hom. Med. Col.
Van Den Bylardt, J. Ed.	Paterson	June 6, '45	Medical Soc. of New Jersey.
Van Winkle, Mark	Little Falls	Oct. 12, '55	Col. of Phys. and Surg., N. Y.
Van Riper, Cornelius S.	Paterson	Mar. 8, '66	Col. of Phys. and Surg., N. Y.
Whitley, William H	Paterson	Mar. 6, '66	Georgetown College.
Wright, Joseph B	Paterson	Mar. 12, '79	New York City University.
Warner, Oswald	Paterson	Oct. 12, '54	Col. of Phys. and Surg, N. Y.
Wolfe, Aaron Robert	Paterson	Mar. 9, '82	Univ. of the City of N. Y.
Was, J. W		Mar. 27, '78	Michigan University.
Withers, H. D	Paterson	Mar. 15, '83	Maryland Academy.

SALEM COUNTY.

Abbott, Clarence G		Mar. 10, '79	Hahneman Med. Col., Phila.
Atkinson, Charles P	Palatine	Feb. 21, '66	University of Med., Phila.
Allen, Lefferson A. D	Woodstown	Mar. 14, '67	University of Pennsylvania.
Bilderback, Frank	Salem	Mar. 11, '70	University of Pennsylvania.
Beckett, Albert T	Salem	Mar. 10, '73	Hahneman Med. Col., Phila.
Backus, Boardman P		Mar. 4, '81	Eclectic Med. Col, Phila.
Cook, Joseph	Daretown	Apr. 3, '47	University of Pennsylvania.
Cheeseman, P	Elmer	Mar. 10, '79	Hahneman Med. Col, Phila.
Conover, James V	Elmer	June 1, '80	Eclectic Med. Col., Pa.
Ewing, Warren L	Alloway	Mar. 30, '82	Jefferson Med. Col., Phila.
English, Felix S	Elmer		Affidavit—20 years' practice.
Foster, Naomi B	Woodstown	Mar. 9, '65	Pennsylvania Med Univ.
Flanigan, Henry M	Pennsgrove	Apr. 27, '65	Eclectic Med. Col., Penna.
Gibbon, Quinton	Salem	Mar. 28, '33	University of Pennsylvania
Gilman, Uriah	Woodstown	Mar. 28, '61	Jefferson Med. Col., Phila.
Glover, Lawrence L	Hancock's Bridge	Mar. 30, '82	Jefferson Med. Col., Phila.
Garrison, Daniel	Pennsville	Mar. 13, '80	University of Pennsylvania.
Johnson, Mayhew	Pennsgrove	July 3, '60	University of Pennsylvania.
Johnson, Henry T	Pedricktown	Mar. 15, '78	University of Pennsylvania.
Jackson, Henry	Salem	Mar. 14, '82	Hahneman Med. Col, Phila.
Moore, David	Pennsgrove	Apr. 29, '65	Eclectic Med. College, Phila.
McPherson, Andrew G	Quinton	Mar. 14, '76	University of Pennsylvania.
Newton, Charles	Sharpstown	May 26, '62	Hahneman Med. Col., Phila.
Presson, John E	Salem	Apr. 7, '49	University of Pennsylvania.
Patterson, Theophilus	Salem	Mar. 9, '48	Jefferson Med. Col., Phila.
Patterson, James A	Salem	Mar. 30, '82	Jefferson Med Col., Phila.
Paulding, Moses J	Daretown	Mar. 11, '65	University of Pennsylvania.
Reed, Lewis W	Woodstown	Mar. 12, '77	University of Pennsylvania.
Robinson, Mary Emma	Salem	Mar. 16, '76	Women's Med. Co., Penna.
Summerill, John M	Pennsgrove	Mar. 13, '75	University of Pennsylvania.
Sharp, Edward S	Salem	Apr. 1, '54	University of Pennsylvania.
Sherron, Clifford M	Salem	Mar. 14, '79	University of Pennsylvania.
Souder, Philip G	Woodstown	Mar. 10, '75	Hahneman Med. Col., Phila.
Stitt, William F	Salem	June 26, '58	Eclectic Med. Col., Phila.
Thompson, Joseph H	Salem	Mar. 31, '37	University of Pennsylvania.
Ware, James B	Pedricktown	Apr. 1, '54	University of Pennsylvania.
Waddington, Benj. A	Salem	Mar. 11, '65	University of Pennsylvania.
Wiley David	Salem	Mar. 11, '70	University of Pennsylvania.
Woodruff Alpheus B	Elmer	Mar. 12, '74	University of Pennsylvania.
Wallace, Lemuel	Alloway	Mar. 14, '72	Eclectic Med. Col., Penna.

SOMERSET COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Beekman, John B	North Branch	June 23, '81	University of New York.
Berg, J. Fred., Jr	North Branch	Mar. 8, '62	Jefferson College, Phila.
Badger, Merritt O		June 9, '81	University of New York.
Compton, Isaac L	Bound Brook	Feb. 28, '79	Columbia Med. College, N. Y.
Cornell, Jacob B	Somerville	Mar. 1, '78	Columbia Med. College, N. Y.
Countin, G. H. B		Mar. 12, —	New York Medical College.
Craig, Lewis	Plainfield	May 8, '32	Med. Society of New Jersey.
Crater, Henry	Somerville	Mar. 11, '72	Hahneman Med. Col., Phila.
Dayton, John	Basking Ridge	June 9, '37	Med. Society of New Jersey.
De Hart, Sarah E		Mar. 23, '70	Medical Academy, New York.
Edwards, John F	Raritan	Mar. 8, '48	New York University.
Field, Chauncey M	Plainfield	Mar. 1, '75	New York Medical College.
Fisher, Claudius R. P	Bound Brook	Mar. 10, '75	Jefferson College, Phila.
Fisher, Farley		Jan. 1, '68	Hobert College, Geneva, N. Y.
Harper, Henry	Findern	Dec. 14, '62	Eclectic Med. College, Phila.
Hawk, Edward P		Mar. —, '58	University of Pennsylvania.
Hecht, John P	Raritan	Mar. 13, '80	Jefferson College, Phila.
Hunt, Azariah P	Somerville	May 9, '48	Med. Society of New Jersey.
Jones, Fred. C		Mar. 1, '77	Columbia Med. College, N. Y.
Keep, Caroline J. Y		Mar. 1, '57	N Y. Homœopathic Med. Col.
Matthews, Benj. B	Bound Brook	Mar. 27, '58	University of Pennsylvania
Mattison, Wm. E	Plainfield	Mar. 4, '52	Columbia Med College, N. Y.
Maynard, James G		Mar. 9, '56	University of Pennsylvania.
Merrell, Wm. H	South Branch	Mar. 1, '69	Bellevue Hosp. Med. Col. N.Y.
Mosher, Abram B		Mar. 12, '79	University of New York.
Mount, David H		Feb. 23, '72	Columbia Med. College, N. Y.
Nelson, Adonis	Neshanic	Mar. 10, '79	University of Pennsylvania.
Pennington, Wm	Basking Ridge	Mar. 5, '66	University of New York.
Perry, Edward	Peapack	Nov. 23, '47	Med. Society of New Jersey.
Quint, Silas H		Mar. 10, '73	Hahneman Med. Col., Phila.
Ribble, Wm. B	Millstone	Apr. 24, '52	Med. Society of New Jersey.
Ribble, Jesse S. B		Mar. 3, '54	Col. of Phys. and Surg. N. Y.
Skillman, Geo. M	Bound Brook	Mar. 10, '81	Hahneman Med. Col., Phila.
Swinton, Wm. J	Somerville	Mar. 1, '73	Bellevue Hosp. Med. Col. N.Y.
Taylor, S. O. B	Millstone	Mar. 12, '72	University of Pennsylvania.
Thornton, Byron	Peapack	Apr. 1, '54	University of Pennsylvania.
Troutman, Seymour C	Somerville	Mar. 3, '54	Univ. of N. Y., C. of Ph. & Sur.
Tompkins, Lucius D	Harlingen	Mar. 12, '77	University of Pennsylvania.
Van Derveer, Henry F	Somerville	Jan. 27, '52	Med. Society of New Jersey.
Van Derveer, James D	North Branch	Mar. 8, '66	Columbia Med. College, N. Y.
Van Deventer, Jno. L		Mar. 13, '81	Columbia Med. College, N. Y.
Van Nest, Geo. V	Weston	Apr. 2, '83	Jefferson College of Phila.
Wagoner, Henry G	Somerville	Apr. 28, '52	Med. Society of New Jersey.
Wilson, Abram S		Mar. 12, '81	Jefferson College of Phila.
Zeglie, Peter J	Warrenville	May 16, '82	Columbia Med. College, N. Y.

SUSSEX COUNTY.

Strader, John C	Lafayette	Dec. 26, '71	Albany Medical Col., N. Y.
Potter, Emerson B	Ogdensburg	Feb. 28, '79	Col. of Phys. and Surg., N. Y.
Cochran, Clarance F	Stanhope	Mar. 26, '73	University of. Michigan.
Fithian, Henry C	Late of Andover	Mar. 12, '77	University of Penna, Phila.
Allen, Carlos	Newton	May 9, '48	Medical Soc. of New Jersey.
Miller, Levi D	Newton	Mar. 8, '55	Univ. of the State of N. Y.
Ferguson, Benjamin W	Beemerville	Mar. 1, '78	Bellevue Hospital.
Cannon, Frederick M	Deckertown	Mar. 1, '67	University of New York.

SUSSEX COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Davison, Calvin R	Stanhope	Mar. 31, '69	University of Michigan.
Potts, Edgar	Coleville	Mar. 15, '76	Univ. of the City of N. Y.
Morrison, Ephraim	Newton	Mar. 1, '75	Bellevue Hospital.
Couse, Joseph P	Hamburgh	Mar. 30, '70	University of Michigan.
Morrison, Joseph	Late of Deckert'n	Mar. 1, '78	Bellevue Hospital.
Jacobus, Peter	Newton	Jan. 20, '58	Eclectic Med. Col., Phila.
Nelden, Charles R	Stanhope	Mar. 3, '64	Bellevue Hosp., N. Y. City.
Cooper, D. W	Unionville	Mar. 9, '55	Univ. of the City of N. Y
Lewis, William Henry	Newton	Mar. 1, '65	Bellevue Hospital.
VanGaasbeck, Harvey D.	Deckertown	Mar. 11, '78	Univ. of the City of N. Y.
Douglas, William H	Ogdensburg	Mar. 1, '79	University of Pennsylvania.
Williamson, Alexander		Mar. 14, '78	University of Penna., Phila.
Rohe, Frederick G	Late of Newton	Mar. 15, '83	New York College.
Jacobus, Peter N	Newton	June 13, '83	Medical Soc of New Jersey.
Drake, Charles F	Newton	Mar. 9, '82	Univ. of the City of N. Y.
Condict, Arthur W	Andover	June 29, '82	University of Michigan.
Beers, Francis	Flatbrookville	Mar. 12, '81	Jefferson College of Phila.

UNION COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Burlingham, Harvey D	Plainfield	——, '57	N. Y. Col. Phys. and Surg.
Brown, Louis R	Elizabeth	——, '64	Pa. Hom. Med. Col., Phila.
Bailey, George W	Elizabeth	——, '62	Pa. Hom. Med Col., Phila.
Bradner, Wesley K		——, '75	Bellevue Hosp. M. Col., N. Y.
Bowen, Robert J	Elizabeth	Feb. 19, '53	American Med. Col., Cin., O.
Boone, William C	Plainfield	Mar. 4, '72	Maryland Academy, Balt.
Burhans, W. M			Univ. of Med and Sur., Phila.
Bates, Cornelius S		Jan. 3, '81	Eclectic M. Col. of Pa, Phila.
Browne, Clifford J	Linden	——, '63	University of New York.
Braun, Rudolph	Elizabeth	——, '83	N. Y. Col. Phys. and Surg.
Coutin, Gustavus H. B			New York Medical College.
Crane, Job S	Elizabeth	Mar. —, '49	N. Y. Col. Phys. and Surg.
Cowan, Isaac F	Cranford		University of Pennsylvania.
Coles, Jonathan A		Feb. 28, '68	Col. of Phys. and Surg., N. Y.
Cladek, Walter B	Rahway	——, '77	University of New York.
Crouthers, Anna J		Mar. 28, '82	N. Y. Med. Col. for Women.
Dart, James M	Cranford	——, '75	N. Y. Hom. Med. Col.
Daly, John J	Rahway	——, '73	Univ. of the City of N. Y.
Drake Lewis			University of Pennsylvania.
Del Risco, J., Jr		——, '79	N. Y. Col Phys. and Surg.
Endicott, George W	Plainfield	——, '75	Jefferson College, Phila., Pa.
Easton, Thomas S	New York City	Apr. 1, '54	University of Pennsylvania.
Friedrich, Gustavus L		Dec. 22, '52	Royal U. Fred. William, Prus.
Fritts, John Thomas	Plainfield	Mar. 1, '66	Bellevue Hosp. Med Col.
Field, Chauncey M	Bound Brook	——, '75	N. Y. Col. Phys. and Surg.
Fortune, David J	Elizabeth	——, '83	Univ. of the City of N. Y.
Gray, Mrs. E. M		Feb. 8, '77	Cin. Lit. and Scien. Inst. and Physio-Med. Col.
Green, James S	Elizabeth	Apr. 5, '51	University of Pennsylvania.
Grier, Joseph H	Elizabeth	——, '61	University of Pennsylvania.
Grier, Philip H	Elizabeth	——, '53	University of Pennsylvania.
Grant, Frank S	Plainfield	——, '75	N. Y. Col. Phys. and Surg.
Glen, Irenaeus R		——, '64	University of Pennsylvania.
Harrison, Joseph B	Westfield	Mar. 1, '76	N. Y. Col. of Phys. and Surg.

UNION COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Hart, Charles A	Plainfield	——, '65	New York Medical College.
Holmes, Charles B	Rahway	——, '74	N. Y. Hom. Med. College.
Hough, H. Page	Rahway		Jefferson College Penna.
Hough, DeWitt Clinton	Rahway	——, '40	Jefferson College Penna.
Hough, Thomas L	Elizabeth	——, '56	Jefferson College Penna.
Johnson, Phebe R		——, '80	N. Y. Eclectic Med. Col.
James, Hiram H	Rahway	——, '63	University of Penna., Phila.
Jobs, Nicholas C	Springfield	Mar. 3, '74	Columbia College, N. Y.
Johnson, William M			University of Michigan.
Keeney, Sarah Danforth	Plainfield	Apr. 1, '74	N. Y. Free Med. C. for Wom.
Kirk, Richmond M		——, '65	Jefferson College Penna.
Kinch, Frederick A	Westfield	May 13, '51	Med. Soc. of New Jersey.
Kinch, Frederick A., Jr.	Westfield	——, '82	N. Y. Col. of Phys. and Surg.
King, Joseph H		Jan. 25, '67	Eclec. College Penna., Phila.
King, Joseph H		June 10, '71	American Univ., Phila., Pa.
Lowrie, Henry H	Plainfield	——, '63	Georgetown College.
Lawrence, William H	Summit	——, '77	University City New Orleans.
Long, Monroe B	Plainfield	Mar. 1, '75	N. Y. College Phys. and Surg.
Larew, Charles		——, '75	Eclectic Med. College, N. Y.
Lukens, Israel	Rahway	Apr. 27, '54	Eclectic Med. College Penna.
Lawrence, B. M		Dec. 25, '65	N. Y. Hygieo Thera. College.
Morton, Joseph B	Elizabeth	——, '49	N. Y. College Phys. and Surg.
Mack, William A. M	Elizabethport	Mar.—, '78	Bellevue Hosp. Med. College.
McLean, Thomas N	Elizabeth	——, '71	Yale College, New Haven.
Mravlag, Victor	Elizabeth	June 21, '72	University of Vienna, Aust'a.
Martin, Robert G	Elizabeth	——, '65	Hom. Med. College, Penna.
Mravlag, Lucy A. G	Elizabeth	Apr. 9, '77	N. Y. Med. College for Wom.
McConnell, Joseph K		Feb. 25, '68	Starling M. C., Columbus, O.
Miller, William H			Univ. Vict Col., Coburg, Can.
McKnight, Charles S		——, '77	N. Y. Col. of Phys. and Surg.
Moorehouse, Elias W	New Providence		University City of New York.
Morris, James A		——, '67	Eclectic Med. College, N. Y.
Muller, Dorothea		Apr. 16, '75	Medical Col., Stuttgart, Ger.
Oakley, Lewis W.	Elizabeth	Mar.—, '52	Col. of Phys. and Surg., N. Y.
Oliver, Frederick W	Rahway	——, '78	Jefferson College Penna.
O'Reilly, Edward R		Mar. 7, '82	Univ. of the City of N. Y.
Pettit, Alonzo	Elizabeth	Feb. —, '67	University of Buffalo, N. Y.
Pickett, John H		——, '60	University of Buffalo, N. Y.
Pinneo, Joseph Otis	Elizabeth	——, '65	Col. of Phys. and Surg , N. Y.
Probasco, John B	Plainfield	Mar. 13, '69	Univ. of Pa. Med. Dept.
Pardee, Howard A		——, '80	Univ. of the City of N. Y.
Page, Rebecca P		——, '69	N. Y. Med. Col. for Women.
Pierson, Henry C		——, '68	M. Dept. of Georgetown Col.
Platt, Joseph H		——, '56	Hom. Med. Col. Penna.
Risk, William H	Summit	Mar.—, '66	University of Penna., Phila.
Rushmore, Edward		——, '72	Jefferson College, Penna.
Reed, Rufus		——, '70	Hahneman Med. Col., Phila.
South, Ephraim W	Plainfield	Feb. 27, '69	Hom. Med. Col., Phila., Pa.
Schleimer, David	Elizabethport	——, '73	Georgetown College.
Stillman, Charles F	New York City	Mar. 1, '67	Col. of Phys. and Surg., N. Y.
Smith, Theodore V		——, '73	New York Hom. Col.
Shotwell, John H	Rahway	Mar. 8, '77	Hom. Col. of Med., N. Y.
Selover, W. U	Rahway	——, '64	Univ. of the City of N. Y.
Silvers, Elihu B	Rahway	——, '52	N. Y. Col. Phys. and Surg.
Sprague, Charles G	Elizabeth	——, '75	New York Hom. Col.
Strong, George W			(College name not legible).

UNION COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Terrill, Thomas, Jr	Elizabeth	Mar. —, '67	N. Y. Col. Phys. and Surg.
Tomlinson, Thomas H	Plainfield		University of Penna., Phila.
Taylor, John L		——, '80	Bellevue Hosp. M. Col., N. Y.
Thoenges, Maria		Mar. 10, '47	(College name not legible).
Talmage, Thomas G		——, '80	Univ. of the City of N. Y.
Turner, William F	Elizabeth	——, '79	University of Pennsylvania.
Titsworth, Randolph		——, '53	Hom. Med. Col., Phila., Pa.
Utter, Albert	Plainfield	——, '47	Univ. of the State of N. Y.
Wescott, Robert	Elizabeth	Apr. —, '53	University of Penna., Phila.
Westcott, Francis W		——, '80	Jefferson Med Col., Phila.
Winans, J. Edward		Mar. 4, '75	N. Y. Hom. Col. of Med.
Westlake, W. C	Rahway	——, '72	N. Y. Hom. Col. of Med.
Younglove, John, Jr	Elizabeth	Mar. 1, '61	Missouri H. M. Col., St. Louis.

WARREN COUNTY.

Brakeley, P. F	Belvidere	——, '42	University of Pennsylvania.
Bieber, E. H	Phillipsburg	——, '48	University of Pennsylvania.
Bieber, L. D	Phillipsburg		University of Pennsylvania.
Baird, William M	Washington	——, '77	Bellevue Medical College.
Barber, Isaac	Phillipsburg	——, '79	University of Pennsylvania.
Bartholomew, Cornelius	Stewartsville	——, '78	Jefferson College Penna.
Clark, Sam'l G	Belvidere	——, '48	University of New York.
Cline, Charles H	Polkville	——, '80	Jefferson College Penna.
Cline, Garner H	Harmony	——, '51	Med. Soc. of New Jersey.
Cooke, Jno. S	Hackettstown	——, '50	University of Pennsylvania.
Creveling, Philip G	Broadway	——, '58	College of Pennsylvania
Crane, Theodore	Hackettstown	——, '55	Col. of Med. and Surg., N. Y.
Cooke, Joseph S	Washington	——, '56	University of Pennsylvania.
Case, Nathan	Reigelsville	——, '69	University of New York.
Cox, Henry M	Port Murray	——, '68	University of Michigan.
Crispin, Sam'l D		——, '81	Jefferson College Penna.
Cole, William	Port Colden	——, '29	Med. Soc. of New Jersey.
Cook, Frank M		——, '83	Med. and Surg. Col., Md.
Curtis, Joseph W		——, '83	University of Maryland.
Dalrymple, Jos. W	Bloomsbury	——, '77	Columbia College, N. Y.
Dearborne, Geo. S	Oxford Furnace	——, '57	Med. College, Albany, N. Y.
Detweller, Henry	Easton, Pa	——, '36	Friberg College.
Detweller, Jno. J	Easton, Pa	——, '54	University of Pennsylvania.
Dowd, Edward J		——, '80	Medical College of Baltimore.
Funk, Henry S	Port Murray	——, '78	Jefferson College of Penna.
Gibbs, Aaron L	Hope	——, '79	University of Philadelphia.
Griffith, John H	Phillipsburg	——, '70	Jefferson College of Penna.
Gale, Alfred	Asbury	——, '33	Middlebury, Vermont.
Gibbs, Aaron Luce	Hope	——, '81	Eclectic Med. Col. of N. Y.
Green, William F	Hainesburg	——, '78	Columbia Med. Col., N. Y.
Herrich, Wm. A	Washington	——, '59	Albany Medical College.
Hartpence, Wm. M	Oxford Furnace	——, '65	Bowdoin College, Maryland.
Hoffman, Ludwic A		——, '80	Hahneman Med. Col., Phila.
Hulshizer, Philip T	Stewartsville	——, '51	Medical College of Penna.
Hoagland, L. B	Oxford Furnace	——, '80	University of Pennsylvania.
Jones, George H	Phillipsburg	——, '70	University of New York.
Johnson, John C	Blairstown	——, '50	Col. of Phys. and Surg., N. Y.
Johnston, Frank	Washington	——, '83	Col. of Phys. and Surg., Md.

WARREN COUNTY—Continued.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
King, Joseph Henry......	....	——, '67	Eclectic Med. College, Penna.
King, Joseph Henry......	....	——, '71	University of Philadelphia.
Lee, A. H....................	Phillipsburg	——, '65	University of Pennsylvania.
Logan, John.................	Easton, Pa.........	——, '77	Eclectic Med. Col. of N. Y.
McGee. Wm. H.	Belvidere	——, '72	Bellevue Med. Col., N. Y.
McCosh, Samuel A.........	Stewartsville	——, '74	Jefferson Med. College, Pa.
Martin, Alden E............	Hackettstown......	——, '76	Hahneman Med. Col., Phila.
McKinstry, Frank P......	Washington	——, '78	Hahneman Med. Col., Phila.
Mortimore, Samuel E.....	....	....	Eclectic Med. Col. of N. Y.
Osmun, L. M................	Phillipsburg	——, '60	Columbia College, D. C.
Osmun, L. C................	Delaware Station..	——, '60	Columbia College, D. C.
Paul, J. Marshall, Jr......	Belvidere	——, '68	University of Pennsylvania.
Power, Edward........	Oxford Furnace...	——, '72	Eclec. Med. Col. of Penna.
Pursel, Peter H.............	Phillipsburg	——, '64	University of Pennsylvania.
Roe, Jacob I.................	Vienna	——, '75	Col. of Phys. and Surg., N. Y.
Roe, Wm. I..................	Vienna	——, '46	Medical Soc. of New Jersey.
Rohrback, Frederich......	Johnsonburg.......	——, '67	Bellevue Med. Col., N. Y.
Roseberry, Chas. J.........	....	....	University of Pennsylvania.
Reese, James Mitchell.....	Phillipsburg	——, '83	Bellevue Med. Col., N. Y.
Stewart, Robert A.........	Hope..................	——, '78	University of New York.
Shepperd, F. P..............	Phillipsburg	——, '66	University of New York.
Stites, William.............	Washington	——, '68	University of Pennsylvania.
Swartsweller, Peter E.....	Polkville	——, '72	University of Pennsylvania.
Sowerby, Joseph John....	Washington	——, '61	University of Pennsylvania.
Young, G. Cursen..........	Roxburg	——, '76	Eclectic Med. Soc., N. Y.

If any omission is discovered in these lists as sent to us by County Clerks, or any corrections are desired, they should be sent to the Clerks of the respective counties and will be noted in the next report. County Societies should now keep a list of all practitioners, and each year the County Clerks should note changes that they may be certified to this Board. It is to the interest of public health that search should be made as to the validity of all doubtful diplomas, and that all good citizens should see to it that none use the title of "Doctor of Medicine" who are prohibited by law therefrom.

REPORT

OF THE

BUREAU OF VITAL STATISTICS

OF THE

STATE OF NEW JERSEY

FOR THE

Statistical Year from July 1st, 1882, to July 1st, 1883,

WITH ADDITIONAL QUINQUENNIAL TABLES.

DEPARTMENT OF STATE.

TO HON. HENRY C. KELSEY, SECRETARY OF STATE.

By EZRA M. HUNT, M.D., Sc.D.,
Medical Superintendent of Vital Statistics.

INTRODUCTION TO THE REPORT ON VITAL STATISTICS.

The statistics of a nation form the ledger by which it keeps account with itself as to all matters that relate to its solvency, its capital, its progress, its material resources and the condition of its constituency. "No inquiry can assume a scientific form unless it has a numerical basis to work upon." It is equally true that in order to study the social basis of a people in its most practical, social, educational and industrial interests, we must inform ourselves as to those conditions which the facts of figures can alone reveal. An English authority, recently speaking on this subject, says: "The question was taken up more and more enthusiastically by enlightened men, until at last the Government Statistical Department was formed, and that remarkable series of reports begun, which will immortalize the name of William Farr. * * * Those reports disclosed a state of things little dreamt of, and the statistical returns, compiled by Dr. Farr, showed how much the life and the health of the nation were dependent upon the conditions in which its individual members were placed."

Statistics which record the "movement of population" even excel in importance those as to (*a*) territory, (*b*) political, (*c*) agricultural, (*d*) industrial, (*e*) commercial and the intellectual, moral and religious condition. Quintelet has well expressed it when he says: "Population is the statistical element *par excellence;* it necessarily rules all the others since it relates above all to the people and the appreciation of their welfare and their wants. * * * The other data have no real value, except so far as they relate to the number of the population. * * * The classification, according to age, allows of the establishment of tables of population, of forming correct ideas on mortality, on the forces at the disposal of the State in case of necessity and of fixing the ratio between the useful fraction which contributes to the general well-being and the fraction which yet requires assistance and support to become in its time useful. The classification by

professions indicates the means by which the population provides for its subsistence and tends to augment its prosperity; it allows the legislator more particularly to fix his attention on the principal wheels which work in the machine confided to his care. The classification by civil condition, by origin, by education, furnishes the administration with no less precious information to assure internal good order and to facilitate the execution of the laws. All questions which are connected with population deserve in general the greatest attention on the part of the government." This has come to be more and more recognized with each succeeding year. The school system which takes cognizance of all those between the ages of five and eighteen, looks after education not as a charity, but because this care of the population is in the interests of the State. Even to make such a census more valuable we need to know how many are born and what proportion of these reach the age of five years, as well as what causes have been operative in reducing the vigor of those now about to enter on school life. If only the feeble died, there might be an incidental advantage in the preservation of a hardier stock. But unfortunately it is found that the infantile deaths are a measure of the enfeeblement of the surviving young population, so that a low sustained death-rate is the best guaranty for the survival of the fittest and the best assurance that those who do survive will be of such strength as to secure abundance for support. In such a land as this there is far more danger of limiting the means of subsistence by lack of vigor in the population than by lack of vigor in the soil or in the demands of productive industries.

The number of marriages is a very fair index of the general vigor and prosperity of the population. It is found that in hard times, or in times of national profligacy, there is always diminution in the number of marriages. The interests of a State are largely concerned in this social relation, as we shall notice more fully in another connection. Not less does the number of deaths indicate the vigor and prosperity of a country or the opposite. For, besides the actual losses of lives more or less valuable, these tell of a tax upon the comfort of families and of community, and upon their ability to secure a livelihood. It often happens that sickness and death paralyze the industries of a people, and are the severest burden of taxation imposed upon them. Where such a tax is avoidable, as is much of prevalent sickness, the State cannot be better employed than in preventing it. Every prudent attempt in this direction is an application of the principles of political

economy. It is a lack of foresight not to make liberal provision to prevent disease, rather than to cause the liberality to depend upon some violent outbreak. What a great pestilence is to cities and States in its paralyzing and discouraging influence, that is sickness and death to each individual family. The marriage, birth and death-rates are found to bear such a proportion to each other and to be such an index of real prosperity or its opposite, that the historical progress or decline of a nation may be traced thereby. The birth-rate does not become excessive where it is only the result of such a marriage-rate as results from announced, legitimate and open marriages. The marriage-rate tends to a right proportion wherever the family and its preservation, care and prosperity are regarded as the defense of the State. The English reports show how "the marriage-rate reflects with much accuracy the condition of public welfare." Its fluctuations coincide in direction though not in degree with those which indicate the success or depression of agricultural, manufacturing or commercial industries. The death-rate has its definite bounds wherever the care of families is such as enforces a proper oversight of the conditions of life and reduces to the minimum the avoidable causes of disease. It is because such statistics afford the data by which we can study the causes that affect these vital conditions of population, that the significance of vital statistics has in the last half century been greatly augmented. Before this, the value of such records was known as bearing on rights of property; on determining questions of age, as of minority or military service, or pensions, and later in the great interests of life insurance. But it has become evident that such records are essential to those studies of life, of disease and of death, on which hinge the dearest interests of the citizens and of the State.

Spencer Wells well expresses it, when, in his recent Hunterian oration before the Royal College of Surgeons, he says: "The knowledge gained by the statistical work of Dr. Farr, and since carried on by Dr. Ogle, at the General Register Office, has led to sanitary legislation, and sanitary work has been followed by a lower general death-rate and smaller mortality in single forms of disease, and especially in those places—the great towns—where sanitation has been most active."

The value and importance of this study has never been more manifested than in the forty-fourth annual report (1881) of the Registrar-General of births, deaths and marriages in England, as just published (1883). The death-register in 1881 numbered 491,935. The death-

rate was 18.9 per 1,000 living; the death-rate in the urban population, consisting of some fifteen and a half million persons, being 20.3, while that of the rural population, comprising some ten and a half million persons, was 16.8. This not only shows a gradual reduction of death-rate, but also how the greater attention paid to health-matters in cities, and the great powers given by the English laws, aid to bring cities to an approximation to the health of rural districts. In some of our own cities the death-rate is nearly double that of the healthiest country districts. Thus the total death-rate of Hunterdon county last year was 14.77 per 1,000, while that of the cities of over 5,000 inhabitants in Hudson county was 29.994 per 1,000.

The remarks of the Registrar-General are so illustrative, and bear so much on the relations of sanitary practice and of statistics to health, that they are here quoted: "There is nothing in the series of annual reports issued by this office that comes out more distinctly and unmistakably than the wonderful effect which the sanitary operations of the last decade have had in saving life. The public health act came into operation in 1872. The average annual death-rate for the immediately preceding ten years (1862–71) had been 22.6, and there were no indications whatsoever of any tendency of the rate to fall lower. Indeed, in 1871, the final year of this period, the rate was exactly the average, viz., 22.6. The act came into force; and at once the rate began to fall, and continued to fall year by year with almost unbroken regularity, until in 1881 it was, as above stated, no more than 18.9. Once only in the ten years that had elapsed since the act came into operation was the rate as high as the average of the previous decade. That was in 1875, when the rate was 22.7. In that year a second public health act, of more stringent character, came into operation; and from that date down to 1881 the death-rate did not once reach 22.0, and averaged no more than 20.5.

"Had the fall in the death-rate been limited to a single year, or to two years, or even to three, it might have been argued by sceptical persons that the improvement was due to a succession of seasons favorable to health, or to other causes unconnected with sanitary administration, and that the setting-in of the fall coincidently with the coming-into-operation of public health measures was no more than casual; but in face of a fall, lasting for ten years in succession and increasing each year in amount, no one can seriously maintain such a position. There can be no real doubt that the saving effected in life was the direct product of the money and labor expended in

sanitary improvements. Doubtless the money thus expended was enormous in amount; and it will be well therefore to consider what return it has brought in."

"Now we shall probably be well within the mark if we assume that for every fatal case of illness there are from four to five more cases which end in recovery. This is about the proportion in enteric fever, which is a more fatal disease than the average of diseases. The result, therefore, on this assumption would be that, speaking in round numbers, there were 500,000 fewer cases of illness, and 92,000 fewer deaths in England and Wales in 1881 than would have been the case had the population been living under the conditions that existed in 1862–71. It may perhaps be objected, and not unreasonably, that the year 1881, with its extraordinarily low death-rate, was so exceptional that it can hardly be taken as a fair sample by which to measure the annual return in life and health from the moneys spent in sanitary improvements. Let us then take the entire period of ten years that elapsed between the first public health act and the close of 1881. Had the death-rate remained during that period at its mean level in the preceding decade, the total deaths from 1872 to 1881, inclusively, would have been 5,548,116, whereas they were actually no more than 5,155,367. Thus no less than 392,749 persons who, under the old regime, would have died, were, as a matter of fact, still living at the close of 1881.* Add to these saved lives the avoidance of at least four times as many attacks of non-fatal illness, and we have the total profits as yet received from our sanitary expenditure. Moreover, it is important to note that these profits were not equally spread over the ten years, but that there was a manifest tendency to progressive increase throughout the period. This is what might be anticipated, for the full effect of sanitary improvements requires time for development."

So far as this State is concerned, it was among the earliest to make an attempt to secure such statistics. However faulty the methods, there was still some advantage in the attempt. The Legislature, in 1878, adopted the present method of collection and record. It has been so far successful, as that the returns furnished will in accuracy and extent compare favorably with any in this country. There is an effort to fulfill the law on the part of those concerned, with the rarest exceptions. The faithfulness of assessors and city clerks is greatly to be commended. The returns of births are below the standard in cities, and it may yet become necessary to make the law as to these

* The mean birth-rates in the two decades, 1862–71 and 1872–81, were almost exactly the same, so that no correction need be made in this case.

more stringent. Such cities as Paterson and Orange show how fully and accurately returns can be secured. As it is possible from the cities and townships in which the returns are more accurate, and from the death-rate under one year of age, to allow for the deficits, so far as comparisons are concerned and deductions are made, the omission is not as disturbing as would at first sight appear. For if we have a sufficient number of actual returns from which to make large generalizations, the omitted events, which belong to exactly the same species of record, in their differences so balance and modify each other that by mathematical formulas "they may be considered as being numerically in the same ratio as the observed (or recorded) events to which they refer."

In the conduct of the Bureau of Vital Statistics it has been the effort of the Board of Health and the medical superintendent to secure those facts, and only those facts, which the ablest authorities on the subject, both in this and other countries, have regarded as essential for record and preservation. The next effort has been to file them in such manner and to record them in such order as shall make them most readily available either for purposes of legal, or social, or medical or sanitary reference. We were so fortunate as to adopt a system and to place the clerical work in such competent hands as has well accomplished this purpose. The result of the medical oversight of the system is to give an order of return, such as shall render the events recorded comparable, and to see to it that the returns are so arranged as shall enable us more especially to determine the causes of diseases and death. It can also be said that to physicians these returns have an educational and clinical value, as they lead to a closer study of the nomenclature of disease, and so to its diagnosis. This always leads to better treatment and to closer watchfulness over all the events of sickness. This has led also to a great extension of inquiry into the preventable causes of disease, and has been one of the influences in aiding those who have special relations to disease. For it is to be acknowledged that until recently most physicians had not come to estimate either the value or importance of that part of education and observation which should accurately acquaint them with the physical surroundings affecting their patients, and with the bearing which these had upon invalidity or death.

As to how far the statistics thus secured should be tabulated and deductions made therefrom and printed as statistical tables, there are some limitations. Some of the facts are only valuable to reason from

after there has been a very large accumulation in numbers. Others, while aiding much the students of sanitation or the Board in testing its work, do not need the printed page, while others which are felt to be desirable are limited by financial considerations. Work with figures, when the figures are to be interpreted as relating to life, is always expensive, and while wise must not too far outrun the appreciation of the legislator or the physician. Most even of the medical profession have never studied numerical methods in this regard. Although John Hunter had inculcated its methods of precision, it was not until the time of Louis, 1832–60, that the use of the numerical method became authenticated. "This last," says Bowditch, "though not infallible, apparently presented a means for as near an approach to the truth as men could hope to secure in medicine. It is now adopted by some of the best minds as the basis of public hygiene."

While the continuous observation of close observers is always valuable, the value is greatly enhanced if facts have been recorded at the time. Indeed, in a vocation which admits of numerical and clinical statements of occurrences, very few who are competent to make reliable observations will be content to do without this aid to their opinions. Quintelet says: "There are many results that can be derived from a record of vital statistics which it is not always obligatory to attempt to derive. For instance, the fact has been ascertained, after very extended comparisons, that the ratio of male births is such that about 106 male children are born to 100 females; that the number of births is greater in the spring than in the summer months." Although such facts are worth knowing and may have a bearing on questions of national vigor, it is not worth while that the statistics be frequently studied to determine facts of this character. On the other hand, it is important to know how many of those born fail to reach majority, or to live to middle life or other designated age, and why they thus fail. For it is thus that we come to a knowledge of the influences which are prevalent to the shortening of human life. Even where we cannot at once intercept the causes, a knowledge thereof is the first hopeful attainment in that direction. The effort, therefore, of this department has been, first of all, to put on record such facts as to the vital movements of population as are deemed important to be accessible for calculations and determinations which social science and political economy have declared to be desirable, and, next, to select from these for study such facts as have the most direct bearing on the welfare of the people. While our records admit of the whole range

of study which is claimed to be of value, other circumstances indicate the selection to be made.

As to marriages, it is desirable to know what has been the number of them for the last five years, what the nationality of those who have been married, and what the occupations of the husbands, and how far residence in city or country seems to modify the marriage-rate.

Some of the facts as to these will be found fully expressed in the tables.

As to births, the name, place and date of births, are matters of identification, and need only the record, and do not need full tables to be printed therefrom. But the parentage of the children, and the number of children as betokening the average size of families, and the number who have previously died, give some important indication as well as the average birth-rate as compared with the death-rate.

Here again the tables give sufficiently, in detail, the results which five years show.

Still-births not only are something of a measure of the vigor of population, but point us often to certain social conditions that have to do with the limitations of life. While the act of causing abortion comes under the criminal code and not under the law, it is found that a watchfulness over premature and still-births is not less in the interests of private and public morality than an important record of the vital or devitalizing causes of such brief life. We find all authorized practitioners disposed to protect families, themselves and the public from the concealment of such births, while the law does much to deter from that criminality in which the failure to make returns is often the strongest evidence of improper interference. It has been asserted by leading medical practitioners in the State that the requirement of a birth certificate has diminished criminal secrecy, and deters those unfitted for complicated cases from venturing so far to imperil the life of mother and child. The loss of mothers and enforced orphanage always means peril to the State in the direction of thriftlessness, pauperism and crime.

Still more significance is attached to the usual death certificates and the classification of their contents. We therefore have heretofore traced the prevalence of some diseases, as consumption, diarrhœa, etc., besides giving each year details as to all the chief diseases which destroy life. From year to year the facts as to these have been prominently kept before the people as well as before the medical profession, and those Local Boards which have special relations to the care of

disease and of the public health. The attention of physicians is especially called to the importance of acquainting themselves with the classification or nomenclature of disease, as contained in the sixth report, pages 285–90.

The study of the tables, as condensed for the last five years, gives many important facts, illustrating how different localities vary in their death-rates, and shows how important is the study of the causes which affect the vitality of population.

DIVORCES IN THE STATE AND THEIR RELATION TO SOCIAL CONDITIONS.

It is not by mere formal custom or by accident that nations and States have always concerned themselves with some regulative laws as to the marriage relation. This has not been in order to patronize the moralities which center around marriage, but directly to insure to the State a reliable constituency for citizenship. The family, and not the individual, is the governmental unit. A sustained nation in which there would be multitudes of people but no marriage, is an impossibility. Laws have not only in the interests of property, but in the interests of natural existence, undertaken to surround marriage with certain safeguards, and to determine the degrees of relationship in which it may occur. When, as by a large class of citizens, it is not surrounded with the restraints and direction of a sacrament, it has been found necessary to make other special provisions for its solemnization and authentication. All the laws that have obtained in Great Britain, as in some other countries, as to previous notification of marriage, have been based upon the idea that clandestine marriages, or too early marriages, or hasty marriages are not in the interests of society and do not accord with the indispensable ethics of government. Our own laws, which inflict certain penalties upon those who perform marriage for those under age, without the consent of parents, or require their own asseveration of having reached a majority, are but the expression of that unwritten code which realizes that all that relates to matrimonial relationship is an integral and essential consideration in natural prosperity and perpetuity. The requirement of a certificate of marriage and of a permanent registry of the event, if it had no necessity as a legal record or as an aid to the study of population, would still be essential as a token of the State's concern for itself and for those thus about to constitute a family. Some States have carried the idea

so far as to require a tax or forfeit from those who cling to single life, because as a class they are less value to the State.

By tracing the ages at which marriage is consummated, the average lives of those marrying, the number of offspring born or raised, and all matters relating to the permanency of the relation, statisticians have been able to estimate the progressive or retrogressive forces of society and thus to warn us to provide against destructive forces. In connection therewith, divorce and the facts as to it become a necessary subject of inquiry. Consequently for a few years past statisticians and political economists have made investigations as to it in our own country, and have discussed with anxiety the portent of certain prevalent tendencies. This has led an able writer to say that "of the present state of social morality in our own country it must be said that the permanence of the family is seriously threatened. With many defects of the times, such a tendency did not show itself with marked prominence until about the middle of this century in the greater multiplication of demands for divorce. Law for a time yielded to this demand by multiplying the grounds of divorce. Strange as it may seem, this laxity commenced in Connecticut by adding, among other causes, habitual intemperance, intolerable cruelty, "bestiality" and "any such misconduct of the other party as permanently destroys the happiness of the petitioner and defeats the purposes of the marriage relation." Connecticut, in the course of fifteen years, from 1849 to 1864, increased its divorces from 94 to 426, and for the fifteen years following averaged 446 annually. For the last fifteen years, or about to 1880, there had been not quite one divorce for every ten marriages. In Vermont the record for 1878 was one divorce to every fourteen marriages, and Maine and Rhode Island showed the same general increase. Massachusetts, with more accurately compiled statistics, shows that while twenty years ago there was one divorce for every fifty-one marriages, in 1880 the rate was one to twenty-one, while the ratio of marriage to the population had much decreased. The present Governor of Massachusetts makes it a leading subject in his annual message. Indiana, Illinois and Ohio have shown the same tendencies, the State of Ohio, for instance, showing one divorce to every nineteen marriages, and some counties of each of these States surpassing this. In the ratio, too, it would be fair to mostly leave out the Catholic population, since that Church almost ignores the possibility of divorce.

In New York somewhat similar increase has taken place and similar laxity of law has prevailed. At a recent decision of the Court of

Appeals, a divorced defendant, whose remarriage would have been bigamy if married again in that State, is declared legally married because the ceremony was performed in an adjacent State.

In Pennsylvania it has been shown that to every ten marriages there is one divorce. The Court of Common Pleas of Philadelphia has the last year drawn attention thereto. Judge Mitchell said: "There is no doubt that our laws are more lax than even those of Indiana. Unfortunately the judge cannot change the laws." Judge Arnold said: "We shall do our best to eradicate what has become a great evil." It is added that the laws of most of the States need reforming on this subject. In 1878 the divorces in England were one to 300 marriages, which was considered an alarming increase.

It is to the honor of our own State that, much more than most of the surrounding States, it has clung to the sanctity of the family relation. Our system of marriage records has done much to emphasize the fact of State oversight, while some of the restraints upon hasty marriages have not been removed. The courts have, as a rule, been restrictive in their tendencies and viewed marriage as far more than an ordinary contract. Our laws of divorce have not undergone the questionable changes which have occurred in some other States. Full testimony is first taken before a master, and then the Court of Chancery can examine parties, and is strict in the interpretation of the law. The Court of Chancery is searching and strict in its interpretation of the law. Still there have been some undue extensions of facility for family dismemberment. Too often those who perform the ceremony are not careful enough to guard the rights of parents, and the civil right of performing marriages has been unduly extended. The chief need is that there be closer guard against hasty marriages, or marriage of those under age without consent of parents or guardians, and that the number of those authorized to perform the marriage ceremony shall not be inordinately multiplied. Some ministers are too careless in marrying those who marry in haste.

It is because we believe the caution to be timely, and prevention to be much better than an increase of divorces, that we notice the statistics of divorces for the five years since the re-organization of our Bureau of State Statistics. Compare these with the statistics of marriages, since both have to do with the vital oversight of population.

We herewith give a table of the number of divorces which have occurred during the last five years; the number by counties, and the causes for which divorce has been granted.

NUMBER OF DIVORCES GRANTED IN THE STATE OF NEW JERSEY, FOR A PERIOD OF FIVE YEARS, FROM JULY 1st, 1878, TO JULY 1st, 1883, IN YEARLY GROUPS.

Year.	Number Granted.	APPLICANTS.		CAUSES.					
		Husband.	Wife.	Adultery.	Desertion.	Extreme Cruelty.	Bigamy.	Impotence.	Near Relation.
1878–79...	144	59	85	60	78	3	1	2	....
1879–80...	149	51	98	56	86	6	....	1	....
1880–81...	137	50	87	52	79	2	2	1	1*
1881–82...	175	58	117	63	103	5	4	....	....
1882–83...	183	56	127	56	115	7	4	1	....
Totals..	788	274	514	287	461	23	11	5	1

* Married mother-in-law.

NUMBER OF DIVORCES GRANTED BY COUNTIES.

COUNTIES.	1878–79.	1879–80.	1880–81.	1881–82.	1882–83.	Totals.	Population, Census of 1880.
Atlantic	....	1	1	4	6	12	18,704
Bergen	4	3	4	5	7	23	36,786
Burlington	5	7	5	5	7	29	55,403
Camden	9	6	7	7	11	40	62,942
Cape May	1	....	1	....	2	4	9,765
Cumberland ...	7	5	1	6	3	22	37,687
Essex...........	33	38	41	44	43	199	189,929
Gloucester......	1	2	2	1	4	10	25,886
Hudson	28	30	17	34	35	144	187,944
Hunterdon	2	3	2	2	4	13	38,570
Mercer	9	6	6	17	10	48	58,061
Middlesex	9	6	5	3	8	31	58,286
Monmouth......	5	7	10	5	6	33	55,538
Morris	4	2	5	4	4	19	50,861
Ocean	1	1	2	3	2	9	14,455
Passaic	9	14	14	16	12	65	68,860
Salem	1	....	1	....	4	6	24,579
Somerset........	2	4	....	2	4	12	27,162
Sussex	1	1	1	2	1	6	23,539
Union............	10	6	7	6	3	32	55,571
Warren	3	4	1	3	3	14	36,589
Out of State...	....	3	4	6	4	17	....
Totals........	144	149	137	175	183	788	1,131,117

SUMMARY OF MARRIAGES FOR FIVE YEARS, FROM JULY 1st, 1878, TO JULY 1st, 1883.

YEAR.	Marriages.	Supplement of each year.
1878–79	7,188	171
1879–80	7,935	227
1880–81	8,109	257
1881–82	8,837	745
1882–83	9,116	....
	41,185	1,400
	1,400	
Totals	42,585	

This gives a divorce rate of 18.50 per 1,000 marriages, or 2,000 persons; or, one di. orce to every 54 1-24 marriages.

Comparisons with the tables of all the years, as to the number of marriages in each county and with the population, will give further details. The result of these comparisons, and of those with other States, indicates that our system of marriage certificate and of procedure in applications for divorce is mainly correct. But in view of the tendencies and some increase in this State, the conditions and sanctity of marriage should be preserved; the officers performing the ceremony should be those of the higher grades, and the grounds on which divorce is granted should not be multiplied.

CLIMATOLOGY.

The report on this subject last year, as a part of the report of vital statistics, sought to present for permanent reference the ground on which the study of local conditions of climate must rest. In the article on comparative facts in climatology and geology, as needed in the study of vital statistics and the causes of disease, the important facts thus needed as to New Jersey are stated.

This year we complete the full statement of data for five years as to those Stations which are taken to represent the different parts of the State. By reference to these and to former reports all the material is found by which local calculations and comparisons with death-rates can be made.

The places relied upon for our reports are as appears in the tables and in the sixth report.

The tables for Cape May, Barnegat and Sandy Hook were kindly furnished by the Signal Service. The records of New York City, Philadelphia and Easton also admit of comparisons. We are, as before, indebted to the following observers:

I. Newton, Miss E. Foster.
II. Paterson, J. T. Hilton, C.E.
III. Newark, Hon. Wm. A. Whitehead.
IV. New Brunswick, Prof. J. C. Smock.
V. Freehold, Chas. F. Richardson, A.M.
VI. Vineland, John Ingram, M.D.
VII. Cape May and Barnegat, U. S. Signal Service.
VIII. Sandy Hook, U. S. Signal Service.

These tables are deserving of the closest study for the five years, as giving a fair outline of what indicates the weather of each locality. The wonderful range of climate which the State affords cannot but attract attention. There is no other State in the country that affords,

in the same area, so remarkable and ascertainable a diversity. Thus, those who may have occasion to choose climates suited to particular conditions, may here find the climate of the North, that of the extreme South, and such variations as are afforded by soil, protection and special locality.

CONDENSED METEOROLOGICAL RECORDS FOR FIVE STATISTICAL YEARS.

Quinquennial Summaries from July 1st, 1878, to July 1st, 1883, to which is appended a Climatological Table of Means for the State of New Jersey.

STATION, NEWTON, N. J.

Latitude, 41° 2′ 45″ N.; Longitude, 2° 19′ 48″ E. Height of Barometer Cistern above Sea Level, 660 feet.

OBSERVER, MISS E. FOSTER.

	Barometer. Reduced to 32°.			Thermometer.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Mon'ly Range.							
1878-79	29.968	28.138	29.287	92.0	-5.0	48.55	41.83	75.49	S.W., N.W.	13.92†	33.0	121	116	13
1879-80	?	?	?	96.0	5.0	53.95	48.83	?	S.W.	?	36.0	83	111	5
1880-81	29.997	28.332	29.167	95.0	-7.9	48.94	48.93	68.53	N.W., S.W.	15.89†	50.45	99	151	11
1881-82	29.943	28.552	29.296	99.0	-6.8	52.44	47.69	72.83	S.W.	43.74	61.5	139	141	30
1882-83	29.932	28.496	29.299	96.1	0.2	50.06	46.03	73.11	S.W., N. E.	41.684	63.7	129	124	25
Mean for 5 years.	29.970	28.379	29.362	95.62	-2.9	50.79	46.66	72.49	S W.	28.8	48.93	114.2	128.6	16.8
Sums	......	......	......	......	......	......	......	......	......	115.234	244.65	571	64.3	84
Extremes	29.997	28.138	......	99.0	-7.9	......	......	......	......	......	......	......	......	......

* Including melted snow. ? No observation. † Record incomplete.

REMARKS.—*Atmospheric Pressure*—The highest daily mean of the barometer occurred in January, 1881. This locality is not affected by areas of high pressure for a longer period than thirty-six hours. Very low depressions do not occur more than four times in a year, and the most rapid changes in winter are not always accompanied by high winds. The months of January, February and March show the widest range. October to May, 1881-2, show a range greatly in excess of the mean.

Temperature—The months of November and February are the ones most frequently marked by sudden changes. The extremest changes do not occur within a shorter period than six hours. The mean daily range of the above period is 15.9°. Highest monthly range was 66°, in April, 1881, being 13° above the mean for that month. August has been the most equable month of all the years.

Humidity—The high humidity of the autumn months causes the first half of each statistical year to show an excess of 3 to 14 per cent. over the latter half. Fogs are mostly the habit of the October, January and February months, those in winter occurring at night.

STATION, CITY HALL, PATERSON, N. J.

Latitude, 40° 55′ N.; Longitude, 74° 11′ W. Height of Rain Gauge above Sea Level, 142 feet.

OBSERVER, JOHN T. HILTON, CITY SURVEYOR.

	BAROMETER. Reduced to 32°. Max.	Min.	Mean.	THERMOMETER. Max.	Min.	Mean.	Mean Mon'ly Range.	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
1878–79				88.0	9.0	50.80	36.40			47.80	36 0	115		
1879–80				98.0	5 0	54.33	47.33			45.32	38.0	110		
1880–81				93.0	-6.0	50.41	48.33			83.48	47.50	114		
1881–82				98.0	-5.0	52.75	40.25			62 69	38.75	130		
1882–83				96.0	0.0	49.58	40.83			73.185	59.50	120		
Mean for 5 years				94.6	0.6	51.57	42.63			62.495	43.95	117.8		
Sums										312.475	219.75	589		
Extremes				98 0	-6 0									

* Including melted snow.

REMARKS —*Temperature*—January—May, 1880 and 1881, had an extremely wide range. Highest monthly range was in May, 1880, 65°, being 16° above the monthly mean.

Rain-fall—The rain of March, 1881, amounting to 16.11 inches, took place at a period when the ground was frozen solidly, and quickly disappeared through the water-courses, hardly moistening the surface of the earth. The drought of 1881 is attributed to the unequal distribution of the rain-fall. During July, August, September and October, there were 98 days on which no rain fell. In September, 1882, occurred the memorable freshet, during which 18 inches of water fell in less than three days. Paterson has an exceptional topographical position as regards the quantity of water that falls on the basin it occupies.

STATION, NEWARK, N. J.

Latitude, 40° 44′ N.; Longitude, 74° 10′ W. Height of Barometer Cistern above Sea Level, 35 feet.

OBSERVER, W. A. WHITEHEAD.

	BAROMETER. Reduced to 32°. Max.	Min.	Mean.	THERMOMETER. Max.	Min.	Mean.	Mean Mon'ly Range.	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
1878–79	30.78	28.85	29.964	98.25	-2.0	53.73	42.98		N.W., S.W.	46.105		128	99	
1879–80	30.70	28.85	30.057	99.25	8.0	53.39	49.63		N.W., S.W.	41.07		94	92	
1880–81	30.85	29.17	30.022	96.0	-5.0	49.21	46.80		N.W., S.W.	47.95		115	92	
1881–82	30.80	29.35	30.064	100.5	3.0	53.64	44.97		N.W., S.W.	26.32		118	73	
1882–83	30 93	29.56	30.130	96.5	2.5	51.24	42.73		N.W.	51.82	41.5	110	149	
Mean for 5 years	30.81	29.15	30.045	98.1	1.3	52.24	45.42		N.W.	44.653		113	101	
Sums										223.265		565	505	
Extremes	30.93	28.85		100.5	-5.0									

* Including melted snow.

REMARKS.—*Atmospheric Pressure*—The annual variations have been slight. 1878-79 had the widest monthly range. The range for June and August, 1879, was greatly in excess of the mean.

Temperature—The mean daily range for the above period is 17.4°. Greatest monthly range was 61° in May, 1880, being nearly 9° above the monthly mean. September, 1881, recorded a maximum of 100.5° and a mean of 73.72°. The months of the fourth statistical year show the least deviation from the mean range.

STATION, AGRICULTURAL COLLEGE FARM, NEW BRUNSWICK, N. J.

Latitude, 40° 29′ N.; Longitude, 74° 26′ W., or 2° 37′ E. Height, 115 feet.

OBSERVER, THEODORE WEST.

	BAROMETER, Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Mon'ly Range.							
1878-79				95.0	-8.0	50.12	43.41		W.S.W.	39.83				
1879-80				98.0	5.0	52.83	50.58		W.S.W.	29.33				
1880-81				95.0	-8.0	48.66	45.08		W., S.	44.93				
1881-82				103.0	-3.0	52 19	43.58		W.S.W.	34.78				
1882-83				95.0	3.0	47.87	44.41		E., W.S.W.	49.12				
Mean for 5 years.				97.2	-2.2	50.33	45.41		W.S.W.	39.598				
Sums										197.99				
Extremes				103.0	-8.0									

* Including melted snow.

REMARKS.—*Temperature*—The winter months show wide ranges. The winters of 1878-79, 1880-81, and 1881-82, were more severe than usual. That of 1880-81 began in November and continued 153 days, of average temperature of 29.28°, (November 22d, 1880, to April 23d, 1881.) Heavy snowfalls; good sleighing for six weeks. Spring of 1879 marked by great changes of temperature. Greatest monthly range, 61°, in May, 1880—8.6° above the average. Rainfall of winter and spring, 1880, much below the mean. Autumn, 1881, noted for its long and severe drought. There was a high percentage of easterly winds in July, August, September and October, 1882.

STATION, FREEHOLD, N. J.

Latitude, 40° 15′ N.; Longitude, 74° 16′ W. Height of Barometer Cistern above Sea Level, 216 feet.

OBSERVER, CHAS. F. RICHARDSON.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Mon'ly Range.							
1878-79	30.47	28.78	29.74	95.0	-3.0	50.74	44.47	77.14	W.	48.43	27.07	157	84	48
1879-80	30.50	29.24	29.88	97.0	8.0	53.52	52.00	76.33	W.	41.84	35.70	119	84	45
1880-81	30.53	28 97	29.81	91.0	-11.0	48.55	48.33	77.14	N.W.	61.49	79.70	132	100	46
1881-82	30.51	29.14	29.84	102.0	-3.0	51.69	47.68	75 97	W.	41.11	50.74	144	100	37
1882-83	30.44	29.06	29.75	96.0	1.0	49.75	45.60	77.42	W.	51.87	43.50	139	88	41
Mean for 5 years.	30.49	29.03	29.804	96.2	-1.6	50.85	47.61	76.80	W.	48.95	47.34	138.2	91.2	43.4
Sums										244.74	236.71	691	456	217
Extremes	30.53	28.78		102.0	-11.0									

* Including melted snow.

REMARKS.—*Atmospheric Pressure*—The mean monthly range of the barometer is low. October to May, 1881-82, show a range slightly in excess of the mean.

Temperature—Excepting July and August, all the months have a wide range. The highest monthly range was 63° in May, 1880, while the greatest excess of the mean range was in December, 1880, being 10.4° above the average. There has been a notable increase of the rain-fall in the winter months.

STATION, VINELAND, N. J.

Latitude, 39° 29′ N.; Longitude, 75° 01′ W. Height of Barometer Cistern above Sea Level, 111 feet.

OBSERVER, J. INGRAM, M.D.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy days.	Thunder and Lightning on Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Mon'ly Range.							
1878-79	30.60	28.66	29.89	96.0	-4.0	52.88	46.75	76.41	S.W.	45.10	11.50	90	......	......
1879-80	30.59	29.01	29.91	97.0	10.0	57.07	55.16	73.00	S.W.	47.00	26.25	105	......	......
1880-81	30.60	28.88	29.84	98.0	-10.5	50.02	50.87	72.00	S.W.	59.99	67.00	102	......	......
1881-82	30.67	29.06	29.94	104.0	0.0	56.17	49.16	65.42	S.W.	40.59	26.00	99	......	......
1882-83	30.61	29 14	29.92	96.0	4.0	53 87	44.66	66.00	S.W., N.W.	54.11	31.75	108	......	......
Mean for 5 years.	30.61	28.96	29.90	98.2	-0.1	53.90	49.32	69.96	S.W.	49.36	32.5	100.8	......	......
Sums	....	....	....	....	....	....	....	......	....	246.79	162.5	504	......	......
Extremes	30.67	28.66	....	104.0	-10.5	....	....	......	....	....	....	......	......	......

* Including melted snow.

REMARKS.—*Atmospheric Pressure*—The first and fifth statistical years are near the average. October to March (inclusive) have a wide range in all the years, excepting December and January, 1879-80.

Temperature—The year 1878-79 is near the average, while 1879-80 is above the average by 8 per cent, and over 13 per cent. above 1880-81. The winter of 1880-81 was of extraordinary severity. There were 128 frosty days, and 51 days during which the temperature was below 32° for the entire day; and during the months of December, 1880, and January and February, 1881, the mean temperature was 27.16°, with extremes of 58° and —10.5°. These fluctuations in temperature have given an extremely wide and variable range to the above series. January, 1879, had a monthly range of 67°, 11.5° above the mean. The drought of 1881 was severe and long continued.

STATION, CAPE MAY, N. J.

Latitude, 38° 56′ N.; Longitude, 74° 58′ W. Height of Barometer Cistern above Sea Level, 27 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Mon'ly Range.							
1878-79	30.74	28.84	29 998	90 0	1.0	53.83	37.33	74.74	N.W.	42.44	....	116	103	....
1879-80	30.81	29.24	30.060	89.0	12.0	57.05	39.50	74.61	S.	50.91	....	125	105	....
1880-81	30.78	29.03	30.000	90.0	2.0	52.20	37.83	75.40	N.W.	60.54	....	144	130	....
1881-82	30.84	29.15	30.038	87.0	5.0	56.33	35.66	75.46	N.W.	40 37	....	144	125	....
1882-83	30.74	29.28	30.043	86.0	11.0	54.71	32.50	77.10	S.	54.83	....	127	78	....
Mean for 5 years.	30.78	29.11	30.027	88.4	6.2	54.82	36.56	75.46	N.W.	49.81	....	131.2	108.2	....
Sums	....	....	....	....	....	....	....	....	....	249.09	....	656	541	....
Extremes	30.84	28.84	....	90.0	1.0	....	....	....	....	....	....	....	....	....

* Including melted snow.

REMARKS.—The mean temperature of the winter months is 36.87°, the second statistical year having the highest, and the third the lowest mean. The higher annual mean of 1879-80 is doubtless owing to the increase of temperature of the winter months.

The above record gives expression to the same results reached by careful comparison of months, years and seasons. For evenness of pressure, temperature and moisture, Cape May has been justly indicated as a remarkable locality.

STATION, BARNEGAT, N. J.

Latitude, 39° 48′ N.; Longitude, 74° 9′ W. Height of Barometer Cistern above Sea Level, 20 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Mon'ly Range.							
1878–79	30.76	28.80	29.996	94.0	-1.0	50.61	39.25	78.84	N. W.	49.38	......	148	91	......
1879–80	30.79	29.09	30.060	96.0	10.0	53.40	56.08	78.72	N. W.	47.27	......	153	107	......
1880–81	30.78	29.02	30.003	94.0	-7.0	49.06	44.50	78.58	N. W.	60.13	......	158	128	......
1881–82	30.82	29.12	30.045	96.0	-1.0	53.03	40.81	78.89	S., N. W.	58.85	......	139	118	......
1882–83	30.78	29.12	30.043	92.5	6.4	51.90	36.37	79.20	E., N. W.	59.78	......	143	110	......
Mean for 5 years	30.78	29.03	30.029	94.5	1.48	51.60	39.40	78.86	N. W.	55.08	......	148.2	110.8	......
Sums	......	......	......	......	......	......	......	......	......	275.41	......	741	564	......
Extremes	30.92	28.80	......	96.0	-7.0	......	......	......	......	......	......	......	......	......

* Including melted snow.

REMARKS.—The monthly ranges have been equable, excepting in January, February and March. Greatest monthly range 62° in January, 1879, is 17° above the mean. The range of the winter months in 1880 was low. The mean temperature of the winter months is 35.28°. The first, third and fifth statistical years were below the mean.

Rains were well distributed by months, excepting through the summer of 1881.

STATION, SANDY HOOK, N. J.

Latitude, 40° 28′ N.; Longitude, 74° 1′ W. Height of Barometer Cistern above Sea Level, 28 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Mon'ly Range.							
1878–79	30.75	28.77	29.978	97.0	-3.0	51.60	40.41	73.68	W.	60.37	......	127	118	......
1879–80	30.77	29.33	30.044	96.0	10.0	55.16	46.25	72.56	S.W., N.W.	46.75	......	118	118	......
1880–81	30.80	29.02	29.994	92.0	-5.0	50.64	44 40	73.62	N W.	53.14	......	126	102	......
1881–82	30.82	29.21	30.040	101.0	0 0	54.50	41.23	74.26	N.W.	46.20	......	140	95	......
1882–83	30.75	29.24	30.045	92.5	3.0	52.00	40.20	76 15	N. E., S. E.	48.23	......	124	88	......
Mean for 5 yrs.	30.77	29.11	30.02	95.7	1.0	52.78	42.49	74.05	N.W.	50.938	......	127	104.2	......
Sums	......	......	......	......	......	......	......	......	......	254.69	......	635	521	......
Extremes	30.82	28.77	......	101.0	-5.0	......	......	......	......	......	......	......	......	......

* Including melted snow.

REMARKS.—The monthly ranges were very equable. Mean temperature of the winter months is 36.85°. The first, third and fifth statistical years were below the mean, although the variations from the mean were not so extreme as at coast stations farther southward.

CLIMATE OF NEW JERSEY.

Table of Means for the Period from July 1st, 1878, to July 1st, 1883—Five Years.

STATIONS.	Altitude.	Barometer. Reduced to 32°. Max.	Min.	Mean.	Monthly Range.	Thermometer. Max.	Min.	Mean.	Monthly Range.	Mean Humidity.	Rain and Melted Snow.	Snow (inches).	Days when Precipitation equalled 0.01.	Cloudy Days.
Newton	660	29.97	28.37	29.362	1.038	95.6	-2.9	50.79	46.66	72.49	28.80	46.93	114.2	126.6
Paterson	80	....	....	....	....	94.6	0.6	51.57	42.63	....	62.495	43.95	117.8	....
Newark	35	30.81	29.15	30.045	.898	98.1	1.3	52.24	45.42	....	44.653	....	113.0	101.0
New Brunswick	90	....	....	....	....	97.2	-2.2	50.38	45.41	....	39.598	....	....	....
Freehold	190	30.49	29.03	29.804	.844	96.2	-1.6	50.85	47.61	76.80	48.95	47.34	138.2	91.2
Vineland	119	30.61	28.95	29.900	.915	98.2	-0.1	53.90	49.32	69.96	49.56	82.50	100.5	....
Cape May	27	30.76	29.11	30.027	.929	88.4	6.2	54.82	36.56	75.46	49.81	....	131.2	108.2
Barnegat	20	30.78	29.03	30.029	.991	94.5	1.48	51.60	39.40	78.86	55.08	....	148.2	110.8
Sandy Hook	28	30.77	29.11	30.020	.984	95.7	1.0	52.78	42.49	74.05	50.938	....	127.0	104.2
For the State	......	30.60	28.96	29.884	.9398	95.39	0.42	52.19	43.94	74.62	47.74	43.18	123.5	107.3

NUMBER OF MARRIAGES, BIRTHS AND DEATHS, BY TOWNSHIPS.

FOR THE YEAR ENDING JUNE 30, 1883.

ATLANTIC COUNTY.

	M.	B.	D.
Absecon	7	10	12
Atlantic City	67	100	144
Buena Vista	1	18	12
Egg Harbor City	22	39	23
Egg Harbor Township	32	66	56
Galloway	4	34	34
Hamilton	7	32	28
Hammonton	13	38	25
Mullica	2	12	19
Weymouth	3	13	8
	158	362	361

BERGEN COUNTY.

	M.	B.	D.
Englewood	15	87	67
Franklin	12	42	28
Harrington	7	21	39
Hohokus	18	52	35
Lodi	15	77	71
Midland	12	28	33
New Barbadoes	41	125	102
Palisade	10	25	43
Ridgefield	15	84	64
Ridgewood	9	18	35
Saddle River	2	28	24
Union	8	81	52
Washington	9	58	49
	173	676	642

BURLINGTON COUNTY.

	M.	B.	D.
Bass River	2	19	10
Beverly	17	21	46
Bordentown	58	186	90
Burlington City	54	132	134
Chester	31	61	80
Chesterfield	8	16	25
Cinnaminson	9	48	34
Delran	14	18	25
Eastampton	1	15	11
Evesham	10	83	34
Florence	9	49	24
Little Egg Harbor	15	54	25
Lumberton	4	17	10
Mansfield	12	34	21
Medford	9	38	37
Mt Laurel	1	21	20
New Hanover	18	34	37
Northampton	61	88	92
Pemberton	26	56	49
Randolph	4	10	6
Shamong	5	5	13
Southampton	11	48	16
Springfield	8	40	14
Washington	1	11	8
Westampton	1	9	7
Willingboro	1	18	10
Woodland	1	5	2
	386	1,021	830

CAMDEN COUNTY.

	M.	B.	D.
Camden	451	762	834
Centre	5	35	39
Delaware	8	20	28
Gloucester City	44	134	117
Gloucester	14	75	77
Haddon	20	59	52
Stockton	7	60	77
Waterford	12	36	35
Winslow	16	43	37
	572	1,224	1,291

CAPE MAY COUNTY.

	M.	B.	D.
Cape May City	11	54	27
Dennis	7	36	22
Lower	15	49	20
Middle	10	47	40
Upper	10	29	22
	53	215	131

CUMBERLAND COUNTY.

	M.	B.	D.
Bridgeton	90	255	135
Commercial	11	15	30
Deerfield	17	21	26
Downe	14	25	13
Fairfield	25	72	35
Greenwich	10	21	12
Hopewell	9	35	20
Landis	51	142	93
Maurice River	10	47	36
Millville	71	244	140
Stoe Creek	5	26	10
	313	903	550

ESSEX COUNTY.

	M.	B.	D.
Belleville	16	68	54
Bloomfield	44	155	102
Caldwell	10	33	37
Clinton	13	50	39
East Orange	31	199	127
Franklin	10	29	26
Livingston	6	10	13
Milburn	9	41	35
Montclair	31	147	80
Newark	1,338	3,952	3,480
Orange	128	418	288
South Orange	19	78	53
West Orange	7	62	60
	1,662	5,242	4,394

GLOUCESTER COUNTY.

	M.	B.	D.
Clayton	17	49	22
Deptford	....	39	30
East Greenwich	9	19	26
Franklin	11	61	42
Glassboro	25	59	43
Greenwich	12	47	19
Harrison	12	59	37
Logan	1	26	22
Mantua	9	43	19
Monroe	14	46	28
South Harrison	....	1	....
Washington	7	25	23
West Deptford	2	19	14
Woodbury	30	65	52
Woolwich	16	52	30
	165	610	407

HUDSON COUNTY.

	M.	B.	D.
Bayonne	61	251	196
Guttenberg	13	43	26
Harrison	31	164	153
Hoboken	349	783	803
Jersey City	948	1,571	3,108
Kearny	8	33	40
North Bergen	19	50	237
Town of Union	83	174	209
Union	2	44	37
Weehawken	64	15	35
West Hoboken	....	171	152
	1,578	3,299	4,996

HUNTERDON COUNTY.

	M.	B.	D.
Alexandria	4	16	17
Bethlehem	18	40	28
Clinton	4	21	20
Delaware	29	60	44
East Amwell	18	30	17
Franklin	15	31	18
Frenchtown	13	19	26
High Bridge	7	39	35
Holland	8	24	30
Kingwood	11	28	29
Lambertville	47	81	57
Lebanon	25	61	48
Raritan	18	48	72
Readington	16	60	37
Tewksbury	12	36	34
Town of Clinton	10	17	13
Union	9	6	15
West Amwell	2	12	9
	261	629	549

MERCER COUNTY.

	M.	B.	D.
Chambersburg	47	168	119
East Windsor	26	24	39
Ewing	8	20	31
Hamilton	10	66	94
Hopewell	22	65	60
Lawrence	6	26	28
Millham	4	68	48
Princeton	27	61	75
Trenton	347	633	622
Washington	....	15	14
West Windsor	5	27	13
	502	1,168	1,188

MIDDLESEX COUNTY.

	M.	B.	D.
Cranbury	16	39	20
East Brunswick	31	71	50
Madison	1	25	21
Monroe	23	45	37
New Brunswick	150	432	460
North Brunswick	13	28	13
Perth Amboy	55	216	189
Piscataway	27	63	59
Raritan	20	49	56
Sayreville	21	20	24
South Amboy	31	74	69
South Brunswick	9	48	49
Woodbridge	23	85	38
	420	1,195	1,085

MONMOUTH COUNTY.

	M.	B.	D.
Atlantic	6	20	20
Eatontown	24	42	54
Freehold	45	89	74
Holmdel	7	22	23
Howell	38	58	50
Manalapan	17	27	41
Marlboro	14	31	32
Matawan	25	57	69
Middletown	32	65	67
Millstone	12	25	23
Neptune	54	128	136
Ocean	63	204	133
Raritan	51	106	90
Shrewsbury	40	114	117
Upper Freehold	25	57	42
Wall	48	134	67
	501	1,174	1,038

MORRIS COUNTY.

	M.	B.	D.
Boonton	27	81	65
Chatham	25	56	78
Chester	20	65	34
Hanover	19	46	105
Jefferson	9	14	31
Mendham	15	20	29
Montville	7	19	22
Morristown	48	119	193
Mt. Olive	18	45	36
Passaic	9	10	16
Pequannock	10	72	38
Randolph	71	210	131
Rockaway	33	151	112
Roxbury	16	51	39
Washington	14	54	48
	341	1,013	977

OCEAN COUNTY.

	M.	B.	D.
Berkeley	....	22	12
Brick	21	33	26
Dover	20	65	27
Eagleswood	5	10	7
Jackson	10	39	28
Lacey	4	23	13
Manchester	6	20	18
Ocean	1	7	12
Plumsted	8	38	23
Stafford	17	21	22
Union	15	17	15
	107	294	208

PASSAIC COUNTY.

	M.	B.	D.
Acquackanonk	6	34	24
Little Falls	13	15	33
Manchester	....	19	15
Passaic	67	247	136
Paterson	594	1,617	1,415
Pompton	25	37	35
Wayne	2	47	21
West Milford	24	57	25
	781	2,073	1,709

SALEM COUNTY.

	M.	B.	D.
Elsinboro	....	9	10
Lower Alloways Creek	4	18	13
Lower Penn's Neck	7	9	26
Mannington	8	15	44
Oldmans	11	29	27
Pilesgrove	21	56	59
Pittsgrove	16	52	32
Quinton	2	25	24
Salem	50	115	117
Upper Alloways Creek	8	31	21
Upper Penn's Neck	22	38	25
Upper Pittsgrove	9	29	18
	158	426	416

SOMERSET COUNTY.

	M.	B.	D.
Bedminster	8	41	35
Bernards	15	42	28
Branchburg	8	16	11
Bridgewater	71	150	153
Franklin	19	38	69
Hillsborough	17	59	51
Montgomery	12	45	33
North Plainfield	18	57	48
Warren	5	19	21
	168	467	449

SUSSEX COUNTY.

	M.	B.	D.
Andover	10	18	21
Byram	18	33	21
Frankford	18	18	35
Green	8	15	8
Hardyston	14	8	28
Hampton	4	10	13
Lafayette	6	5	5
Montague	7	2	8
Newton	30	29	39
Sandyston	7	9	14
Sparta	21	19	41
Stillwater	18	30	12
Vernon	12	20	20
Walpack	6	3	3
Wantage	19	40	57
	198	249	315

UNION COUNTY.

	M.	B.	D.
Clark	....	1	7
Cranford	6	18	12
Elizabeth	241	831	686
Fanwood	....	25	24
Linden	18	30	32
New Providence	2	19	12
Plainfield	57	191	161
Rahway	56	117	181
Springfield	4	21	12
Summit	11	46	38
Union	11	27	35
Westfield	16	42	38
	417	1,368	1,188

WARREN COUNTY.

	M.	B.	D.
Allamuchy		4	2
Belvidere	12	81	35
Blairstown	16	30	22
Franklin	18	23	19
Frelinghuysen	8	10	8
Greenwich	15	17	18
Hackettstown	40	55	48
Hardwick	1	8	5
Harmony	9	29	14
Hope	8	38	28
Independence	14	5	13
Knowlton	17	31	17
Lopatcong	2	36	23
Mansfield	4	21	27
Oxford	26	123	81
Pahaquarry	3	7	3
Phillipsburg	82	251	147
Pohatcong	7	32	20
Washington Borough	18	56	36
Washington Township	7	15	25
	307	822	591

TOTALS OF MARRIAGES, BIRTHS AND DEATHS FOR ALL THE COUNTIES.

	M.	B.	D.
Atlantic	158	862	861
Bergen	173	676	642
Burlington	386	1,021	830
Camden	572	1,224	1,291
Cape May	58	215	131
Cumberland	318	903	560
Essex	1,662	5,242	4,394
Gloucester	165	610	407
Hudson	1,578	8,299	4,996
Hunterdon	261	629	549
Mercer	502	1,168	1,188
Middlesex	420	1,195	1,085
Monmouth	501	1,174	1,038
Morris	341	1,018	977
Ocean	107	294	208
Passaic	731	2,078	1,709
Salem	158	426	416
Somerset	168	467	449
Sussex	198	249	315
Union	417	1,368	1,188
Warren	307	822	591
	9,166	24,430	23,310

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

COUNTIES. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																				
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Atlantic	88	53	27	104	88	361	18,701	19.30	2	6	......	2	1	1	27	54	24	21	25	22	19	11	27	10	13	11	......	6	10
Bergen	136	91	60	172	178	642	36,786	17.45	12	8	......	18	1	4	20	58	23	29	92	39	42	30	48	4	31	14	2	3	35
Burlington	168	85	61	261	247	830	55,403	14.98	10	26	4	4	1	9	25	71	43	81	70	54	62	24	74	1	40	24	......	6	26
Camden	343	162	122	396	255	1,291	62,942	20.51	18	50	1	30	1	6	46	166	72	94	116	92	82	32	102	3	32	23	1	7	38
Cape May	30	7	9	39	44	131	9,765	13.41	2	4	......	1	......	......	5	14	7	16	13	4	5	4	20	1	1	4	......	......	5
Cumberland	129	39	64	145	166	550	37,687	14.59	......	26	......	8	1	1	17	58	30	60	71	26	38	13	46	2	19	13	......	4	13
Essex	1046	648	469	1414	774	4,394	189,929	23 13	46	101	1	300	18	53	210	437	366	311	532	316	205	168	293	18	223	87	9	53	140
Gloucester	80	51	34	115	120	407	25,886	15.72	3	6	......	3	4	1	14	47	21	36	48	24	32	12	37	2	23	12	......	2	17
Hudson	1268	1005	486	1606	581	4,996	187,944	26.58	56	114	4	210	68	47	319	651	309	300	674	481	216	149	226	18	227	80	1	49	247
Hunterdon	87	62	61	136	198	549	38,570	14.23	7	11	......	25	4	2	35	52	20	37	55	21	38	18	57	4	21	9	1	8	18
Mercer	243	146	113	377	287	1,188	58,061	20.46	9	32	2	14	2	2	71	128	102	75	107	65	55	42	104	4	51	27	6	5	46
Middlesex	232	162	123	312	226	1,085	52,286	20 75	7	21	......	34	5	10	104	137	70	79	121	61	44	43	67	2	38	25	1	2	49
Monmouth	216	113	98	298	287	1,038	55,538	18.69	9	24	......	18	1	4	52	123	69	71	102	51	68	37	82	3	41	29	1	9	45
Morris	176	121	107	271	271	977	50,861	19.21	23	20	......	37	4	4	30	70	60	58	143	70	66	31	102	6	22	16	4	7	83
Ocean	46	16	23	63	53	203	14,455	14.04	......	4	1	5	......	3	5	22	17	16	26	13	5	7	15	1	6	2	......	3	6
Passaic	496	254	171	489	285	1,709	68,860	24.82	32	43	39	42	4	25	41	268	115	109	184	154	81	51	56	1	49	29	5	15	50
Salem	97	35	40	112	127	416	24,579	16.92	7	11	2	1	2	2	12	45	25	30	56	18	19	15	35	2	13	10	......	3	13
Somerset	80	53	36	122	155	449	27,162	16.53	11	11	......	10	5	5	15	41	22	29	63	28	31	16	40	1	16	11	1	......	16
Sussex	38	30	33	110	100	315	23,539	13.38	8	9	......	4	......	1	23	16	25	29	36	17	22	11	28	3	7	5	......	3	8
Union	260	195	146	342	238	1,188	55,571	21.37	21	26	......	60	2	9	46	149	79	76	148	88	74	28	53	3	33	22	1	9	57
Warren	119	84	56	176	147	591	36,589	16.15	7	11	......	27	7	......	29	49	28	37	74	39	28	17	50	1	17	8	......	4	35
Totals	5378	3412	2338	7060	4827	23.310	1,131,117	20.60	290	564	51	853	131	189	1146	2656	1527	1594	2756	1683	1235	759	1562	90	923	461	33	198	907

Death-rate per 1,000 from these diseases, exclusive of accidents, 19.80. Note that consumption has two columns.

Return of Deaths from all Causes and Certain Specified Diseases, in the Cities of the State of New Jersey, of over 5,000 Population, for the Year ending June 30th, 1883.

Cities Having Over 5,000 Population. Statistical Divisions	Deaths at all ages. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Principal causes of death. Remittent fever, &c.	Typhoid fever	Small-pox.	Scarlet fever.	Measles.	Whooping-cough	Croup and diphtheria	Diarrheal diseases.	Consumption. M	Consumption. F.	Acute lung diseases	Brain and nervous diseases of children.	Diseases of heart and circulat'n.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intest'l diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Atlantic County.																													
Atlantic City	46	27	11	39	21	144	5,477	*26.29	......	3	......	......	......	1	16	29	9	9	10	10	10	2	8	10	3	4	......	3	5
Burlington County.																													
Bordentown	16	11	11	28	23	90	5,334	16.67	1	1	......	1	1	......	6	......	7	8	8	6	9	2	8	1	1	3	......	1	1
Burlington	20	19	9	46	39	134	7,237	18.51	......	2	1	......	......	......	3	6	5	18	12	9	11	7	12	......	5	5	......	1	8
Camden County.																													
Camden City	229	111	78	265	145	834	41,659	20.01	13	39	1	18	1	2	30	111	50	63	66	64	51	20	68	2	16	15	1	2	21
Gloucester City	33	14	16	30	29	117	5,347	21.88	1	1	......	2	......	1	4	17	5	7	12	7	7	3	5	......	......	1	......	2	6
Cumberland County.																													
Bridgeton	30	6	19	35	41	135	8,722	15.48	......	11	......	......	......	......	2	12	7	13	21	9	11	1	13	......	9	1	......	1	5
Millville	39	13	24	44	22	140	7,660	18.27	......	4	......	6	......	1	9	19	11	17	17	5	6	6	6	2	3	4	......	1	2
Essex County.																													
Newark	830	531	393	1135	576	3,480	136,508	25.49	30	89	1	271	8	37	182	354	297	245	404	254	157	135	237	14	167	60	9	39	115
Orange	78	41	26	94	44	288	13,207	21.80	1	4	......	16	2	5	7	25	28	23	47	25	12	9	9	2	17	7	......	4	8
Hudson County.																													
Bayonne	57	39	19	62	19	196	9,372	20.91	1	4	......	3	1	3	9	40	7	14	25	19	6	7	8	1	8	3	......	......	16
Harrison	40	28	17	47	20	153	6,898	22.18	2	13	......	18	......	4	3	19	10	8	15	16	2	2	6	1	4	1	1	2	9
Hoboken	213	165	61	294	69	803	30,999	25.90	3	14	1	26	4	3	61	111	57	45	102	79	45	21	39	6	34	17	......	11	40
Jersey City	773	633	313	990	372	3,108	120,722	25.74	29	65	2	150	52	34	178	403	171	194	412	314	133	55	135	10	164	48	......	29	151
Town of Union	56	60	37	39	17	209	5,849	35.73	6	4	......	3	4	1	52	24	14	8	30	18	8	4	7	......	4	4	......	1	2
Mercer County.																													
Chambersburg	31	16	19	27	20	119	5,437	21.88	1	7	......	......	......	......	14	16	8	4	13	9	3	4	7	......	6	1	......	......	......
Trenton	144	100	59	183	124	622	29,910	20.79	7	16	2	14	2	2	42	75	59	37	63	38	27	17	38	2	28	12	4	3	26
Middlesex County.																													
New Brunswick	103	85	62	119	86	460	17,166	26.79	2	7	......	23	4	6	61	55	28	32	52	20	14	25	22	2	16	11	......	1	16
Morris County.																													
Morristown	27	34	24	51	60	198	6,837	28.96	5	2	......	2	1	......	17	16	11	15	37	13	8	5	18	1	2	6	......	2	5
Passaic County.																													
Passaic	41	26	15	33	20	136	6,532	20.82	1	7	......	6	......	4	2	22	4	10	15	11	9	5	3	......	1	2	1	2	7
Paterson	416	210	143	409	225	1,415	51,031	27.72	20	31	39	35	4	18	38	224	100	90	154	132	60	42	45	1	42	25	4	11	32
Salem County.																													
Salem City	27	8	9	35	39	117	5,056	23.14	2	......	2	......	......	1	4	8	10	10	20	6	5	5	16	......	3	2	......	1	3
Union County.																													
Elizabeth	166	141	91	174	111	686	28,229	24.30	11	13	......	48	1	8	31	92	43	39	76	62	40	13	23	2	22	11	......	3	33
Plainfield	43	23	18	45	32	161	8,125	19.81	......	2	......	3	......	1	7	29	11	11	23	9	9	5	2	......	4	5	1	2	6
Rahway	23	10	15	43	36	131	6,455	20.29	3	2	......	6	......	......	2	15	10	15	16	8	6	4	10	......	2	3	......	1	4
Warren County.																													
Phillipsburg	39	34	9	38	21	147	7,181	20.46	1	3	......	6	2	......	21	17	7	7	11	9	3	1	13	......	3	1	......	1	6
Totals	3520	2385	1498	4295	2202	14,023	576,950	24.30	140	344	49	657	87	132	801	1739	969	942	1651	1152	652	430	758	57	564	252	21	124	527

Death-rate per 1,000, from these diseases, exclusive of accidents, 23.39. *** See note page 349.**

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

ATLANTIC COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Absecon	3	3	2	3	1	12	507	......	......	......	......	......	......	......	2	3	1	......	......	1	......	......	......	......	1	......	......	......	1
Atlantic City	46	27	11	39	21	144	5,477	*26.29	......	3	......	......	......	1	16	29	9	9	10	10	10	2	8	12	3	4	......	3	5
Buena Vista	1	3	1	1	6	12	885	......	......	......	......	......	......	......	3	1	......	1	......	......	......	......	2	......	......	......	......	......	......
Egg Harbor City	5	3	3	5	7	23	1,232	......	......	......	......	1	......	......	1	4	......	......	2	4	......	1	2	......	2	1	......	1	......
Egg Harbor Township	12	8	......	22	14	56	3,568	......	1	......	......	......	......	......	1	8	3	6	7	2	5	4	4	......	1	1	......	1	1
Galloway	7	3	1	14	9	34	2,337	......	......	2	......	......	......	......	......	2	2	2	2	2	2	3	5	......	......	1	......	......	......
Hamilton	4	3	4	6	10	28	1,464	......	......	......	......	......	......	......	3	3	4	8	2	1	......	1	2	......	1	1	......	1	......
Hammonton	4	2	1	9	9	25	1,776	......	1	1	......	1	......	......	......	1	4	......	1	1	1	......	......	......	2	2	......	......	1
Mullica	3	1	3	4	8	19	717	......	......	......	......	......	......	......	1	2	1	......	1	1	1	......	1	......	2	1	......	......	1
Weymouth	3	......	1	1	3	8	741	......	......	......	......	......	1	......	......	1	......	......	......	......	......	......	3	......	1	......	......	......	1
Totals	88	53	27	104	88	361	18,704	19.30	2	6	......	2	1	1	27	54	24	21	25	22	19	11	27	12	13	11	......	6	10

Death-rate per 1,000, without cities of over 5,000 population, 16 40.

* This and all other cities of health resort have an excessive death-rate by reason of temporary increase of population, generally including a proportion of invalids above the average. Local Boards keep a record as to this.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

BERGEN COUNTY.	DEATHS AT ALL AGES.								PRINCIPAL CAUSES OF DEATH.																				
Statistical Divisions.	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Englewood	9	7	6	25	21	67	4,076	......	......	3	......	1	......	1	2	7	4	4	14	2	4	......	7	......	4	2	......	......	3
Franklin	10	2	1	9	6	28	2,206	......	......	......	......	......	......	......	1	4	1	......	2	3	4	2	1	......	1	......	......	......	......
Harrington	7	2	4	10	16	39	2,570	......	......	1	......	2	......	......	3	1	2	2	4	2	3	3	7	......	2	1	......	......	1
Hohokus	5	2	5	11	12	35	2,920	......	1	1	......	......	......	......	1	1	3	......	7	......	1	2	2	......	......	3	......	......	5
Lodi	21	14	7	13	14	71	4,071	......	......	3	......	5	......	......	1	10	1	4	4	6	5	1	5	2	5	......	......	1	4
Midland	3	5	2	9	14	33	1,591	......	......	......	......	......	......	......	2	1	......	3	5	1	3	2	5	......	1	......	......	1	......
New Barbadoes	30	20	10	21	21	102	4,248	......	1	......	......	10	......	1	3	15	1	1	13	6	9	5	3	......	4	1	1	1	2
Palisade	9	9	4	8	12	43	2,302	......	......	......	......	......	......	1	6	2	......	3	7	5	2	2	4	......	......	1	......	......	3
Ridgefield	12	8	8	22	15	64	3,952	......	4	......	......	......	......	1	......	5	4	2	12	4	3	4	5	......	3	3	......	......	7
Ridgewood	7	6	2	8	9	35	1,478	......	......	......	......	......	1	......	......	6	1	2	3	4	2	3	3	......	2	......	......	......	......
Saddle River	4	3	3	8	6	24	1,355	......	1	......	......	......	......	......	......	......	2	3	4	1	......	1	1	......	4	......	......	......	2
Union	8	7	7	17	12	52	3,164	......	4	......	......	......	......	......	1	3	3	3	6	5	4	2	......	1	2	1	1	......	6
Washington	11	6	1	11	20	49	2,853	......	1	......	......	......	......	......	......	3	1	2	11	......	2	3	5	1	3	2	......	......	2
Totals	136	91	60	172	178	642	36,786	17.45	12	8	......	18	1	4	20	58	23	29	92	39	42	30	48	4	31	14	2	3	35

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

BURLINGTON COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Bass River	3	2		2	• 3	10	1,006								1	3	1	1				1	2						
Beverly	6	10	5	17	8	46	3,128					1			2	6	2	4	1	3	3	1	6		2	2			3
Bordentown	16	11	11	28	23	90	5,334	16.87	1	1		1	1		6		7	8	8	6	9	2	8	1	1	3		1	1
Burlington	20	19	9	46	39	134	7,237	18 51		2	1				3	6	5	18	12	9	11	7	12		5	5		1	8
Chester	4		1	13	12	30	2,855									3	2	2			5	1	7		3	2			
Chesterfield	4	2		6	13	25	1,525									3	2	1	3	1	2	2	5			1			
Cinnaminson	8	5	2	7	8	34	2,184		2	2				1		4	1	2		5	4		2		6				1
Delran	8		3	7	7	25	1,760			3						2	2	1	1	3					3				
Evesham	9	3	3	13	6	34	1,602		1	1	3	1		1		4	1		1	5	3	1	2		1			1	1
Eastampton	3	1	1	5	1	11	566									3	2	1		2			1						
Florence	6	3	3	9	2	24	1,528			1					3	1	4	2	2	1	2		3					1	
Little Egg Harb	7	1	1	7	9	25	1,881							2			2	3	3	1	2		1		1	1			1
Lumberton	2		3	2	3	10	1,689							1			1	2	1	1					2				
Mansfield	5	1	1	8	6	21	1,643							1	1	2	1	3		2	1	1	1						2
Medford	7	2	1	11	15	37	1,980			3				1		4	1	5	4	2	4	1	5		2	1			
Mt. Laurel	7	2		6	7	20	1,739		1	1						2	1	1	4	3		3	1						1
New Hanover	8	3	4	12	9	37	2,373			3					1	4	1	3	2	1	4		4		2	2		1	1
Northampton	20	9	5	25	32	92	4,630		2	4		1		1	4	10	1	16	9	4	5		7		4	1			4
Pemberton	9	6	2	11	20	49	2,885		1	3					2	7	2	2	7	1	4	2	4		5	3			
Randolph	1	1		3	1	6	428							1			1			1		1	1						
Shamong	3			6	4	13	1,097			1						1	1	1	4	1	1		1						1
Southampton	5	1	2	1	7	16	2,269									4			4						2	1			1
Springfield	4	2		6	3	14	1,866									2	1		2	1	1				1	1			1
Washington	1		1	2	4	8	389			1					1		1	2											
Westampton		1	2	2	2	7	715		1						1			2			1								
Willingboro	2		1	6	1	10	743		1									1		1		1	1			1		1	
Woodland					2	2	325												2										
Totals	168	85	61	261	247	830	55,403	14 98	10	26	4	4	1	9	25	71	43	81	70	54	62	24	74	1	40	24		6	26

Death-rate per 1,000, without cities of over 5,000 population, 14.14.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

CAMDEN COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.								PRINCIPAL CAUSES OF DEATH.																				
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Camden	229	111	78	265	145	834	41,659	20.01	13	39	1	18	1	2	30	111	50	63	66	64	51	20	68	2	16	15	1	2	21
Centre	9	6	4	9	10	39	1,532	......	......	2	......	......	......	2	2	3	2	3	3	4	3	......	2	1	......	2	......	......	2
Delaware	4	2	5	6	6	23	1,481	......	......	......	......	1	......	......	3	2	2	2	3	1	1	......	......	......	1	......	......	......	......
Gloucester City	33	14	16	30	20	117	5,347	21 88	1	1	......	2	......	1	4	17	5	7	12	7	7	3	5	......	......	1	......	2	6
Gloucester	13	4	5	33	22	77	2,527	......	......	2	......	1	......	1	......	5	4	6	6	5	9	1	10	......	8	2	......	1	5
Haddon	9	9	4	11	19	52	2,551	......	2	2	......	2	......	......	5	8	......	3	10	2	4	3	4	......	2	......	......	1	1
Stockton	19	9	6	21	20	77	3,532	......	1	4	......	1	......	......	2	7	2	7	12	4	7	2	5	......	2	2	......	1	1
Waterford	10	1	2	13	9	35	2,149	......	......	......	......	......	......	......	......	5	5	3	4	2	......	1	4	......	3	......	......	......	......
Winslow	17	6	2	8	4	37	2,158	......	1	......	......	5	......	......	......	8	2	......	......	3	......	2	4	......	......	1	......	......	2
Totals	343	162	122	396	255	1,291	62,942	20.51	18	50	1	30	1	6	46	166	72	94	116	92	82	32	102	3	32	23	1	7	38

Death-rate per 1,000, without cities of over 5,000 population, 21.83.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

CAPE MAY COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Cape May City	12	1	4	7	3	27	1,699	......	1	1	......	......	......	......	2	6	1	......	3	2	......	1	4	......	......	1	......	......	......
Dennis	7	......	1	9	[illegible]	22	1,812	......	......	1	......	......	......	......	......	3	......	2	4	......	......	2	3	......	......	1	......	......	......
Lower	5	2	......	3	10	20	1,977	......	......	1	......	......	......	......	1	2	....	2	1	1	......	......	4	......	......	......	......	......	1
Middle	5	1	4	15	15	40	2,575	......	......	1	......	......	......	......	......	2	4	10	3	1	4	......	5	1	1	......	......	......	3
Upper	1	3	......	5	11	22	1,702	......	1	......	......	1	......	......	2	1	2	2	2	......	1	1	4	......	......	2	......	......	1
Totals	30	7	9	39	44	131	9,765	13.41	2	4	......	1	......	......	5	14	7	16	13	4	5	4	20	1	1	4	......	......	5

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

CUMBERLAND COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Bridgeton	30	6	19	35	41	135	8,722	15.48	.....	11	.....	.....	.....	.....	2	12	7	13	21	9	11	1	13	.....	9	1	.....	1	5
Commercial	9	1	.....	7	10	30	2,265	.....	.....	1	.....	.....	.....	.....	.....	1	3	2	2	2	3	.....	4	.....	.....	2	.....	.....	2
Deerfield	4	.....	3	4	12	26	1,643	.....	.....	.....	.....	.....	.....	.....	2	1	.....	1	6	1	1	.....	2	.....	.....	1	.....	.....	1
Downe	4	1	1	4	4	13	1,687	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2	3	.....	1	1	3	.....	.....	.....	.....	.....	.....
Fairfield	10	2	1	10	11	35	3,215	.....	.....	2	.....	.....	.....	.....	1	9	2	6	2	1	2	.....	3	.....	1	2	.....	.....	1
Greenwich	3	1	1	.....	7	12	1,215	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	2	1	1	.....	1	.....	.....	.....	.....
Hopewell	2	.....	3	5	11	20	1,794	.....	.....	.....	.....	1	1	.....	.....	.....	.....	4	3	.....	1	1	2	.....	1	1	.....	.....	.....
Landis	15	9	7	26	36	93	6,005	.....	.....	6	.....	.....	.....	.....	2	7	5	9	15	3	8	3	8	.....	3	1	.....	2	2
Maurice River	11	6	4	7	8	36	2,374	.....	.....	2	.....	1	.....	.....	1	4	2	5	2	4	1	.....	3	.....	1	.....	.....	.....	.....
Millville	39	13	24	44	22	140	7,660	18.27	.....	4	.....	6	.....	1	9	19	11	17	17	5	6	6	6	2	3	4	.....	1	2
Stoe Creek	2	.....	1	3	4	10	1,107	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	1	2	.....	1	.....	.....	1	.....	.....	.....
Totals	129	39	64	145	166	550	37,687	14.59	.....	26	.....	8	1	1	17	58	30	60	71	26	38	13	46	2	19	13	.....	4	13

Death-rate per 1,000, without cities of over 5,000 population, 12.91.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

ESSEX COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.
Belleville	20	6	4	11	13	54	3,004	......
Bloomfield	20	15	5	28	31	102	5,748	......
Caldwell	2	3	5	8	16	37	3,167	......
Clinton	8	7	5	6	10	39	2,742	......
East Orange	30	17	15	41	23	127	8,349	......
Franklin	4	1	1	12	8	26	1,617	......
Livingston	2	......	......	1	10	13	1,401	......
Millburn	4	5	2	15	8	35	1,743	......
Montclair	20	9	5	28	16	80	5,147	......
Newark	830	531	393	1135	576	3,480	136,508	25.49
Orange	78	41	26	94	44	288	13,207	21.80
South Orange	12	4	3	17	8	53	3,911	......
West Orange	16	9	5	18	11	60	3,385	......
Totals	1046	648	469	1114	774	4,391	189,929	23.13

ESSEX COUNTY. Statistical Divisions.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.
Belleville	1	......	......	......	......	1	1	10	1	5
Bloomfield	3	1	......	1	......	1	5	9	7	7
Caldwell	1	1	......	1	......	2	4	......	2	......
Clinton	......	......	......	3	1	......	3	1	2	......
East Orange	2	2	......	4	3	......	4	11	7	11
Franklin	1	1	......	1	......	......	......	......	4	2
Livingston	......	......	......	......	......	......	......	1	......	......
Millburn	7	......	......	1	......	......	......	3	4	3
Montclair	......	1	......	......	4	3	1	9	5	7
Newark	30	89	1	271	8	37	182	354	297	245
Orange	1	4	......	16	2	5	7	25	28	23
South Orange	......	2	......	......	......	......	1	7	......	7
West Orange	......	......	......	2	......	4	2	7	9	1
Totals	46	101	1	300	18	53	210	437	366	311

ESSEX COUNTY. Statistical Divisions.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Belleville	5	6	1	1	3	1	5	1	......	1	3
Bloomfield	11	6	7	5	9	......	7	6	......	3	1
Caldwell	5	2	5	2	6	1	2	......	......	......	......
Clinton	5	4	2	2	1	......	5	2	......	......	......
East Orange	17	10	8	6	5	......	5	5	......	2	7
Franklin	6	1	2	1	4	......	......	......	......	......	......
Livingston	1	......	2	1	2	......	2	1	......	......	......
Millburn	2	2	1	1	3	......	1	......	......	2	2
Montclair	10	4	5	3	6	......	3	4	......	1	1
Newark	401	254	157	135	237	14	167	60	9	39	115
Orange	47	25	12	9	9	2	17	7	......	4	8
South Orange	7	......	3	2	5	......	2	......	......	......	2
West Orange	12	2	......	......	3	......	7	1	......	1	1
Totals	532	316	205	168	293	18	223	87	9	53	140

Death-rate per 1,000, without cities of over 5,000 population, 15.56.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

GLOUCESTER COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation	Urinary diseases.	Adult Brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Clayton	3	6	2	6	5	22	1,981	...	...	...	...	...	...	...	...	3	1	2	5	1	1	...	2	...	2	1	...	1	2
Deptford	9	2	4	7	9	30	1,520	...	...	1	...	...	...	...	2	7	1	2	3	1	4	1	1	...	2	...	...	1	1
East Greenwich	3	...	2	10	11	26	...	...	...	1	...	...	...	...	...	2	...	4	2	1	4	...	3	...	3	1	...	...	...
Franklin	10	3	6	13	9	42	2,480	...	...	...	...	1	2	...	...	5	3	6	3	4	3	1	1	...	1	...	...	...	1
Glassboro	8	8	2	13	9	43	2,088	...	1	2	...	...	1	...	1	3	7	1	3	5	2	...	1	...	1	2	...	...	1
Greenwich	5	3	1	2	6	19	2,598	...	...	...	...	...	...	...	...	2	...	1	8	...	1	...	3	1	...	...	...	...	2
Harrison	5	5	2	13	10	37	2,841	...	...	...	...	...	1	...	3	6	1	4	6	...	3	2	6	...	2	...	...	...	...
Logan	3	2	...	7	10	22	1,765	...	1	1	...	...	...	...	1	3	...	...	1	...	2	2	2	1	1	2	...	...	2
Mantua	4	1	4	5	4	19	1,718	...	1	...	...	1	...	...	2	2	...	1	2	3	2	...	2	...	1	1	...	...	...
Monroe	6	5	1	8	8	28	1,858	...	...	...	...	...	...	...	...	3	2	4	5	1	3	1	4	...	1	1	...	...	...
South Harrison	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Washington	4	7	3	1	8	23	1,366	...	...	...	...	1	...	...	3	2	1	1	2	4	2	1	1	...	...	2	...	...	1
West Deptford	5	2	1	5	1	14	1,399	...	...	1	...	...	...	1	1	2	...	3	1	...	1	...	1	...	...	...	...	...	1
Woodbury	9	5	5	13	21	52	2,298	...	...	...	...	...	...	...	1	4	3	2	7	4	4	3	7	...	4	1	...	...	5
Woolwich	6	2	1	12	9	30	1,974	...	...	...	...	...	...	...	...	3	2	5	5	...	...	1	3	...	5	1	...	...	1
Totals	80	51	34	115	120	407	25,886	15.72	3	6	...	3	4	1	14	47	21	36	48	24	32	12	37	2	23	12	...	2	17

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

HUDSON COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption M.	Consumption F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Bayonne	57	39	19	62	19	196	9,372	20.91	1	4	......	3	1	3	9	40	7	14	25	19	6	7	8	1	8	3	......	......	16
Guttenburg	13	2	2	7	2	26	1,206	....	4	1	......	1	......	......	......	4	......	1	2	4	2	......	......	......	......	1	......	......	2
Harrison	40	28	17	47	20	153	6,898	22.18	2	13	......	18	......	4	3	19	10	8	15	16	2	2	6	1	4	1	1	2	9
Hoboken	213	165	61	294	69	803	30,999	25.90	3	14	1	26	4	3	61	111	57	43	102	79	45	21	39	6	34	17	......	11	40
Jersey City	773	633	313	930	372	3,108	130,722	25.74	29	65	2	150	52	34	178	403	171	194	412	314	133	85	135	10	164	48	......	29	151
Kearny	11	5	1	16	4	40	777	....	1	2	......	2	......	......	......	5	3	1	10	1	......	1	......	......	......	1	......	1	7
North Bergen	43	41	22	83	50	237	4,268	....	2	3	1	2	3	1	4	24	34	18	38	11	6	15	25	......	8	2	......	1	10
Town of Union	56	60	37	39	17	209	5,849	35.73	6	4	......	3	4	1	52	24	14	8	30	18	8	4	7	......	4	4	......	1	2
Union	9	9	......	13	6	37	1,310	....	......	2	......	......	......	......	2	4	3	1	7	3	2	4	1	......	1	1	......	1	......
Weehawken	9	6	2	15	1	35	1,102	....	1	......	......	1	1	......	4	5	1	......	6	2	1	8	......	......	......	......	......	1	9
West Hoboken	44	17	12	50	21	152	5,441	....	7	6	......	4	3	1	6	12	9	10	27	14	11	7	5	......	4	2	......	2	1
Totals	1268	1005	486	1606	581	4,996	187,944	26.58	56	114	4	210	68	47	319	651	309	300	674	481	216	149	226	18	227	80	1	49	247

Death-rate per 1,000, without cities of over 5,000 population, 37.36.
Death-rate per 1,000, without cities of over 5,000 population, and without North Bergen township, which has the County Institutions, 29.48.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

HUNTERDON COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Alexandria	1	1	2	2	9	17	1,324			1						1		3	3		1		2						1
Bethlehem	4	3	3	7	10	28	2,830			1		1				3	2	3	2	5	3	1	2			1			1
Clinton	4		3	5	7	20	2,133					1			1	2		2	1		2	1	2		2				
Delaware	8	3	3	8	21	44	3,092			1			1		1	5	3	1	4	4	2	1	8		1	2			1
East Amwell			1	8	7	17	1,696										1		3		2	1	3						1
Franklin		3	2	6	6	18	1,338							1	2			1	1		1		2			2		2	
Frenchtown	2	9		7	9	26	1,039		1					1		6	1	1	3	2	2	1	3		4				
High Bridge	4	4	4	14	8	35	2,209		2			1	1			1	2	3	2	3	1	2	3	1	1	1		2	8
Holland	6	1	1	6	15	30	1,846		2	1					1	3			2		3	3	7	1				1	1
Kingwood	6	3	2	4	13	29	1,694									3	2	2	3	2	3	2	3		2				
Lambertville	8	6	7	21	16	57	4,183		1	2		3			9	6	1	7	6	1	4	2	2		3	1		1	1
Lebanon	7	8	8	5	18	48	2,699			4		4	1		4	4		2	7	1	2		1			1	1	1	3
Raritan	12	13	12	18	17	72	4,188		1			3			16	8	3	3	4	2	4	1	4	1	4	1		1	3
Readington	6	2	1	12	18	37	3,103					1				3	2	6	4		1	3	7		2				1
Tewksbury	8	5	6	5	11	34	2,108					11				4	1	1	5	1	2		3		1				
Town of Clinton	5		2	3	4	13	842						1					1	1		2		3		1				1
Union	6	1	4	3	2	15	1,168			1					1	3	1		4		1		1						1
West Amwell				2	7	9	1,039										1	1			2		1	1					
Totals	87	62	61	136	198	549	38,570	14.23	7	11		25	4	2	35	52	20	37	55	21	38	18	57	4	21	9	1	8	18

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

MERCER COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Chambersburg	31	16	19	27	20	119	5,437	21.88	1	7	....	....	....	....	14	16	8	4	13	9	3	4	7	....	6	1	....	....	....
East Windsor	7	2	2	15	11	39	2,271	....	....	....	....	....	....	....	1	2	2	5	5	2	7	1	2	....	....	1	....	....	1
Ewing	5	3	4	46	24	81	2,412	....	....	1	....	....	....	....	4	3	6	5	1	2	3	2	30	1	4	3	....	2	1
Hamilton	8	7	7	40	32	94	3,370	....	....	2	....	....	....	....	3	7	6	10	10	5	2	3	9	....	2	6	1	....	5
Hopewell	5	2	6	17	27	60	4,462	....	....	1	....	....	....	....	2	3	4	4	5	1	3	5	12	....	1	1	....	....	1
Lawrence	6	8	5	6	8	28	3,174	....	....	....	....	....	....	....	1	2	1	2	2	1	4	3	2	....	....	2	1	....	1
Millham	15	4	2	16	6	43	....	....	....	4	....	....	....	....	3	3	6	2	7	2	....	....	....	....	1	....	....	....	3
Princeton	17	9	7	17	25	75	4,348	....	1	1	....	....	....	....	1	17	6	3	9	4	4	4	3	....	8	1	....	....	4
Trenton	144	100	59	183	121	622	29,910	20.79	7	16	2	14	2	2	42	75	69	37	53	38	27	17	38	2	28	12	4	3	26
Washington	1	....	1	6	6	14	1,281	....	....	....	....	....	....	....	....	1	1	2	1	....	2	1	....	1	1	....	....	....	2
West Windsor	4	....	1	4	4	13	1,396	....	....	....	....	....	....	....	....	....	1	1	1	1	....	2	1	....	....	....	....	....	2
Totals	243	146	113	377	287	1,188	58,061	20.46	9	32	2	14	2	2	71	129	102	75	107	65	55	42	104	4	51	27	6	5	46

Death-rate per 1,000, without cities of over 5,000 population, 19.68.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

MIDDLESEX COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Cranbury	4	2	1	7	3	20	1,599	......	......	......	......	......	......	......	1	3	4	......	......	1	......	1	3	......	1	......	......	......	3
East Brunswick	8	6	5	15	13	50	3,272	......	......	1	......	2	......	......	3	4	4	5	3	3	2	2	4	......	3	2	......	1	1
Madison	5	2	......	7	7	21	1,662	......	......	......	......	......	......	......	......	1	3	......	2	1	1	1	2	......	1	......	......	......	2
Monroe	6	3	3	8	14	37	3,017	......	......	1	......	......	......	......	2	4	2	2	6	2	......	3	2	......	1	2	......	......	1
New Brunswick	103	85	62	119	86	460	17,166	26.79	2	7	......	23	4	6	61	55	28	32	52	20	14	25	22	2	16	11	......	1	16
North Brunswick	3	2	1	4	3	13	1,251	......	1	......	......	......	......	......	......	3	1	2	2	......	1	......	......	......	......	......	......	......	......
Perth Amboy	44	25	19	37	14	139	4,808	......	2	6	......	1	......	......	22	26	6	7	11	10	5	3	5	......	6	1	......	......	5
Piscataway	14	3	3	16	22	59	3,242	......	......	2	......	......	1	......	......	8	8	5	9	3	2	3	8	......	2	......	......	......	4
Raritan	1	6	8	22	16	56	3,789	......	......	......	......	2	......	......	4	3	1	9	9	2	5	1	6	......	1	......	......	......	8
Sayreville	1	3	3	8	1	24	1,930	......	......	1	......	1	......	......	......	5	2	2	2	3	......	......	......	......	......	1	......	......	1
South Amboy	17	9	7	19	16	69	3,648	......	1	2	......	2	......	......	4	9	4	4	8	8	4	......	6	......	1	3	......	......	2
South Brunswick	5	4	7	18	12	49	2,803	......	......	......	......	2	......	1	3	4	5	3	5	1	4	3	3	......	2	3	1	......	2
Woodbridge	21	12	4	32	19	88	4,099	......	1	1	......	1	......	3	4	12	7	8	12	7	6	1	6	......	4	2	......	......	4
Totals	232	162	123	312	226	1,085	52,286	20.75	7	21	......	34	5	10	104	137	70	79	121	61	44	43	67	2	38	25	1	2	49

Death-rate per 1,000, without cities of over 5,000 population, 17.79.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

MONMOUTH COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Atlantic	7	1	......	6	6	20	1,743	......	......	1	......	......	......	......	1	1	......	1	2	1	1	......	1	......	1	......	......	......	1
Eatontown	7	5	1	20	11	54	2,642	......	......	3	......	......	......	......	......	6	6	9	......	2	4	2	4	1	3	2	......	......	1
Freehold	9	9	6	24	24	74	4,302	......	......	2	......	......	......	......	9	5	4	4	5	2	6	6	7	......	6	6	......	......	2
Holmdel	6	1	3	5	8	23	1,575	......	......	......	......	......	......	......	1	2	......	2	5	......	6	1	1	......	......	1	......	......	......
Howell	8	9	8	8	16	50	3,374	......	......	2	......	......	......	3	2	4	1	5	5	2	4	2	6	......	1	2	......	......	6
Manalapan	9	1	......	17	18	41	2,175	......	......	......	......	......	......	......	1	2	6	5	7	......	3	2	4	......	3	1	......	3	......
Marlboro	9	4	......	7	13	32	2,193	......	......	1	......	......	......	1	1	6	2	2	1	2	2	1	3	......	......	1	......	......	1
Matawan	14	8	7	25	11	69	3,699	......	1	2	......	......	......	......	7	9	3	5	7	6	3	8	4	......	2	1	......	......	1
Middletown	15	5	8	15	24	67	5,059	......	2	......	......	......	......	......	2	9	4	3	5	7	3	2	10	......	3	1	......	2	5
Millstone	3	4	3	6	6	23	2,080	......	......	2	......	......	......	......	1	2	1	1	6	1	1	2	1	......	......	......	......	......	......
Neptune	37	22	19	36	23	136	4,157	......	2	5	......	4	......	......	2	27	5	5	18	9	8	4	10	......	4	1	......	2	3
Ocean	24	17	13	36	33	133	6,027	......	3	......	......	9	......	......	2	14	7	6	12	6	10	2	12	1	4	3	1	1	13
Raritan	27	9	10	22	22	90	3,891	......	1	2	......	3	1	......	12	14	10	7	11	2	2	2	3	......	3	1	......	1	2
Shrewsbury	20	10	6	41	35	117	6,526	......	......	2	......	1	......	......	3	8	10	7	12	10	6	5	5	1	9	8	......	......	6
Upper Freehold	5	3	3	12	20	42	3,236	......	......	......	......	......	......	......	3	3	5	4	3	1	3	2	5	......	......	1	......	......	......
Wall	16	5	11	18	17	67	3,829	......	......	2	......	1	......	......	5	11	5	5	3	......	6	1	6	......	2	......	......	......	4
Totals	216	113	98	298	287	1,038	56,538	18.69	9	24	......	18	1	4	52	123	69	71	102	51	68	37	82	3	41	29	1	9	45

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

MORRIS COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Boonton	21	7	7	14	15	65	2,682		2	1		3		1	1	8	8	4	4	8	3	2	5	1	1	1			4
Chatham	9	5	6	23	29	73	4,276					1			1	5	10	5	18	1	3	1	5	1	1	4			2
Chester	15	2	3	6	8	34	2,337		1							5	1	1	5	4	1		4		1		1		1
Hanover	8	6	4	55	32	105	4,138			3					4	3	6	3	9	8	8	1	*12		4	2			8
Jefferson	4	2	5	8	10	31	1,792			1		1					1	1	1	3	6	1	1		3	1	1	1	1
Mendham	7	2	1	4	15	29	1,526		1					1		2		2	4	1	6	1	2	1		1			1
Montville	1	4	2	5	10	22	1,270		2	2					2	1	2	2	3		1	1	1		1				2
Morristown	27	34	24	51	60	198	6,837	28.96	5	2		2	1		17	16	11	15	37	13	8	5	*18	1	2	6		2	5
Mount Olive	5	7	5	13	7	36	1,982		2			1				1	1	5	3	4	4	1	1	1				1	1
Passaic	3	1		5	7	16	1,896									1			6	1	2	1	1	1				1	
Pequannock	8	6	5	11	8	38	2,239		2	2		1		2		1	5	1	2	4	5	2			2				8
Randolph	41	17	15	34	23	131	7,700		1	1		6	2		3	11	9	5	18	9	7	4	11		4		1	1	5
Rockaway	28	17	23	20	21	112	7,366		4	4		16			1	12	2	7	22	10	7	5	5		2		1	1	4
Roxbury	9	3	3	14	9	39	2,139		3	1		2	1			1	2	3	4	1	4	1	3		1				1
Washington	10	8	4	8	17	48	2,651			3		4			1	3	2	4	7	8	1	5	3			1			
Totals	176	121	107	271	271	977	50,861	19.21	23	20		37	4	4	30	70	60	58	143	70	66	31	102	6	22	16	4	7	33

Death-rate per 1,000, without cities of over 5,000 population, 17.69. * Morristown and Hanover township include Asylum deaths.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

OCEAN COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total; including undefined	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption, F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Berkeley	3	.....	1	6	2	12	683	.....	.....	.....	.....	.....	.....	1	.....	.....	2	2	3	1	.....	.....	.....	.....	1	.....	.....	.....	.....
Brick	3	.....	4	6	12	26	2,99[illegible]	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	2	4	1	2	1	2	.....	2	.....	.....	1	2
Dover	9	2	3	8	5	27	2,139	.....	.....	.....	.....	.....	.....	.....	.....	4	2	2	2	2	1	3	.....	.....	.....	.....	.....	.....	2
Eaglewood	4	.....	1	1	1	7	592	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Jackson	3	4	3	6	11	28	1,803	.....	.....	2	.....	2	.....	.....	1	2	4	2	3	2	.....	.....	5	1	1	.....	.....	.....	1
Lacey	2	1	1	4	5	13	814	.....	.....	.....	.....	.....	.....	.....	2	1	.....	.....	4	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Manchester	6	2	1	6	3	18	1,057	.....	.....	1	.....	.....	.....	.....	.....	6	.....	1	2	1	.....	.....	1	.....	.....	.....	.....	1	.....
Ocean	3	2	.....	5	2	12	484	.....	.....	1	.....	.....	.....	2	.....	.....	1	.....	3	1	1	2	.....	.....	.....	.....	.....	.....	.....
Plumsted	6	.....	2	9	6	23	1,561	.....	.....	.....	.....	1	.....	.....	.....	2	.....	2	3	1	.....	1	1	.....	.....	1	.....	1	1
Stafford	5	.....	3	10	4	22	1,008	.....	.....	.....	1	2	.....	.....	.....	3	4	2	1	1	1	.....	4	.....	1	1	.....	.....	.....
Union	2	5	4	2	2	15	1,024	.....	.....	.....	.....	.....	.....	.....	2	1	.....	2	1	3	.....	.....	1	.....	.....	.....	.....	.....	.....
Totals	46	16	23	63	53	203	14,455	14.04	.....	4	1	5	.....	3	5	22	17	16	26	13	5	7	15	1	6	2	.....	3	6

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

PASSAIC COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Acquackanonk	6	1	2	8	6	24	1,781	......	......	1	......	......	......	......	......	6	......	2	3	1	1	......	3	......	2	......	......	......	1
Little Falls	10	7	3	15	6	38	1,404	......	6	1	......	......	......	......	......	10	5	1	4	2	2	1	......	......	1	1	......	......	4
Manchester	1	4	1	4	5	15	1,513	......	1	1	......	1	......	......	......	3	1	2	......	1	1	......	......	......	1	......	......	......	1
Passaic	41	26	15	33	20	136	6,532	20.82	1	7	......	6	......	4	2	22	4	10	15	11	9	5	3	......	1	2	1	2	7
Paterson	416	210	143	409	225	1,415	51,031	27.72	20	31	39	35	4	18	38	224	100	90	154	132	60	42	45	1	42	25	4	11	32
Pompton	5	5	3	7	12	35	2,251	......	3	2	......	......	......	1	......	1	1	1	3	3	5	3	1	......	1	......	......	1	1
Wayne	8	1	3	6	3	21	1,757	......	1	......	......	......	......	......	1	2	1	1	1	3	1	......	......	......	1	......	......	1	3
West Milford	9	......	1	7	8	25	2,591	......	......	......	......	......	......	2	......	......	3	2	4	1	2	......	4	......	......	1	......	......	1
Totals	496	254	171	489	286	1,709	68,860	24.82	32	43	39	42	4	25	41	268	115	109	184	154	81	51	56	1	49	29	5	15	50

Death-rate per 1,000, without cities of over 5,000 population, 13.98.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

SALEM COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult Brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Elsinboro	2	2	2	1	3	10	570	......	1	1	......	......	......	......	......	3	......	......	1	......	......	......	1	......	......	......	......	......	......
Lower Alloways Creek	2	......	2	7	2	13	1,373	......	1	1	......	......	......	......	......	1	1	......	1	1	......	1	......	......	2	......	......	......	3
Lower Penn's Neck	6	1	3	10	6	26	1,334	......	2	3	......	......	......	......	......	......	1	5	4	......	1	4	1	1	......	......	......	......	......
Mannington	11	4	3	11	12	44	2,230	......	......	2	......	......	......	......	1	6	2	2	5	......	1	......	5	......	1	......	......	......	2
Oldmans	8	2	2	9	5	27	......	......	......	......	......	1	1	......	2	3	2	4	4	2	1	......	1	......	1	1	......	1	......
Pilesgrove	14	6	5	15	17	59	3,497	......	......	3	......	......	1	......	1	8	5	2	7	2	5	1	3	1	2	1	......	......	4
Pittsgrove	4	5	5	7	14	32	1,778	......	......	......	......	......	......	1	......	3	......	4	4	4	2	2	5	......	......	3	......	......	......
Quinton	6	......	6	6	4	24	1,390	......	......	1	......	......	......	......	2	2	2	1	3	......	......	......	1	......	1	3	......	......	......
Salem	27	8	9	35	39	117	5,056	23.14	2	......	2	......	......	1	4	8	10	10	20	6	5	5	16	......	3	2	......	1	3
Upper Alloways Creek	6	3	1	3	8	21	1,917	......	......	......	......	......	......	......	......	4	1	......	4	2	......	1	1	......	2	......	......	......	1
Upper Penn's Neck	8	2	2	5	7	25	3,361	......	......	......	......	......	......	......	......	5	1	1	2	1	4	1	1	......	1	......	......	1	......
Upper Pittsgrove	3	2	......	3	10	18	2,073	......	1	......	......	......	......	......	2	2	......	1	1	......	......	......	......	......	......	......	......	......	......
Totals	97	35	40	112	127	416	24,579	16 92	7	11	2	1	2	2	12	45	25	30	56	18	19	15	35	2	13	10	......	3	13

Death-rate per 1,000, without cities of over 5,000 population, 15.31.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

SOMERSET COUNTY. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																				
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Bedminster	2	6	5	13	10	35	1,812	......	.....	......	......	4	......	......	......	1	5	1	4	2	5	2	3	......	2	......	......	......	1
Bernards	6	3	1	7	9	28	2,622	......	1	2	......	......	......	......	1	5	1	2	1	......	1	......	......	......	3	2	1	......	1
Branchburg	1	2	.....	5	3	11	1,316	......	......	......	......	......	1	......	......	1	......	1	1	1	1	......	1	......	......	......	......	......	2
Bridgewater	31	18	13	39	52	153	7,997	......	2	5	......	3	1	4	7	17	4	12	18	14	15	6	17	......	4	3	......	......	8
Franklin	12	7	3	18	28	69	3,818	......	3	1	......	1	2	......	......	3	6	......	13	4	5	3	6	......	2	2	......	......	5
Hillsborough	7	4	4	13	25	51	3,248	......	1	1	......	......	......	......	3	4	1	4	11	......	3	2	5	......	1	1	......	......	4
Montgomery	4	3	3	10	10	33	1,928	......	2	2	......	......	......	1	......	2	1	2	5	2	2	1	2	......	1	1	......	......	......
North Plainfield	13	5	5	14	11	48	3,217	......	......	......	......	2	1	......	2	8	4	5	6	3	1	2	3	1	2	1	......	......	......
Warren	4	5	2	3	7	21	1,204	......	2	......	......	......	......	......	2	......	......	2	4	2	1	......	3	......	1	1	......	......	......
Totals	80	53	36	122	155	449	27,162	16 53	11	11	......	10	5	5	15	41	22	29	63	25	34	16	40	1	16	11	1	......	16

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

SUSSEX COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Andover	.....	1	3	7	10	21	1,150	.....	1	2	.....	.....	.....	.....	3	.....	.....	3	1	1	1	.....	6	.....	.....	.....	.....	2	.....
Byram	2	4	3	5	7	21	1,406	.....	.....	.....	.....	.....	.....	.....	2	2	.....	2	4	2	1	.....	2	.....	2	.....	.....	.....	.....
Frankford	7	1	6	6	14	35	1,682	.....	.....	1	.....	.....	.....	.....	3	1	2	4	6	1	4	1	1	.....	.....	2	.....	.....	2
Greene	1	.....	.....	2	.....	3	727	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hardyston	6	5	2	11	3	28	2,645	.....	1	1	.....	2	.....	.....	1	1	2	2	6	3	3	1	.....	.....	.....	.....	.....	1	1
Hampton	1	.....	.....	8	4	13	895	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	.....	1	.....	.....	.....	1	.....	1	.....	.....	1
Lafayette	.....	.....	1	2	2	5	781	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....
Montague	.....	.....	.....	2	1	3	1,022	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	1	.....	.....	.....	.....
Newton	1	5	7	14	10	39	2,513	.....	.....	.....	.....	.....	.....	.....	9	1	5	.....	1	2	5	3	4	.....	.....	1	.....	.....	.....
Sandyston	1	1	3	4	5	14	1,195	.....	2	1	.....	.....	.....	.....	1	1	.....	1	.....	.....	.....	2	1	1	2	.....	.....	.....	.....
Sparta	9	6	2	15	9	41	2,274	.....	.....	.....	.....	.....	.....	1	3	3	5	5	4	4	2	1	3	.....	1	1	.....	.....	.....
Stillwater	1	1	.....	5	5	12	1,502	.....	2	.....	.....	.....	.....	.....	.....	.....	1	1	1	1	.....	.....	2	.....	.....	.....	.....	.....	.....
Vernon	3	.....	2	8	8	20	1,811	.....	.....	.....	.....	.....	.....	.....	.....	1	3	2	4	2	.....	1	2	1	.....	.....	.....	.....	2
Walpack	.....	.....	.....	1	2	3	575	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Wantage	6	6	4	20	20	57	3,361	.....	1	4	.....	2	.....	.....	1	6	6	4	7	.....	6	1	4	.....	1	.....	.....	.....	2
Totals	38	30	33	110	100	315	23,539	13.38	8	9	.....	4	.....	1	23	16	25	29	36	17	22	11	28	3	7	5	.....	3	8

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

UNION COUNTY. Statistical Divisions.	DEATHS AT ALL AGES: Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH: Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Clark	1	1	1	3	1	7	353	......	......	......	......	......	......	......	1	......	......	2	2	......	......	......	......	......	......	......	......	......	......
Cranford	1	......	1	5	4	12	1,184	......	......	1	......	......	......	......	......	1	......	......	1	......	1	......	5	......	......	......	......	......	1
Elizabeth	166	141	91	174	111	686	28,229	24.30	11	13	......	48	1	8	31	92	43	39	76	62	40	13	23	2	22	11	......	3	33
Fanwood	4	3	1	9	7	24	1,167	......	......	2	......	......	......	......	......	2	......	1	4	2	1	1	3	......	1	......	......	......	......
Linden	7	3	3	13	7	32	1,889	......	2	1	......	......	......	......	2	5	2	2	5	2	4	......	1	......	......	......	......	1	1
New Providence	2	......	2	5	3	12	781	......	1	......	......	......	......	......	......	......	1	1	4	......	1	......	......	......	......	......	......	......	2
Plainfield	43	23	18	45	32	161	8,125	19.81	......	2	......	3	......	1	7	29	11	11	23	9	9	5	2	......	4	5	1	2	6
Rahway	23	10	15	43	36	131	6,455	20.29	3	2	......	6	......	......	2	15	10	15	16	8	6	4	10	......	2	3	......	1	4
Springfield	......	1	1	5	5	12	844	......	1	......	......	......	......	......	......	......	2	2	1	......	2	1	......	......	1	......	......	......	1
Summit	7	4	6	15	6	38	1,910	......	......	2	......	1	......	......	......	2	3	......	7	3	4	3	2	......	......	......	......	1	5
Union	4	7	3	9	12	35	2,418	......	3	2	......	2	1	......	2	......	4	1	5	2	4	1	1	......	1	......	......	......	1
Westfield	2	2	4	16	14	38	2,216	......	......	1	......	......	......	......	1	3	3	2	4	......	2	......	6	1	2	3	......	1	3
Totals	260	195	146	342	238	1,188	55,571	21.37	21	26	......	60	2	9	46	149	79	76	148	88	74	28	53	3	33	22	1	9	57

Death-rate per 1,000, without cities of over 5,000 population, 16.45.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1883.

WARREN COUNTY. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption. M.	Consumption. F.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Allamuchy				1	1	2	648										1												1
Belvidere	4	4	4	17	8	35	1,773		2			4				3	5	2	5	1	1	2	2		3			1	2
Blairstown	1	4		5	10	22	1,458								2				2	2	3	2	3		2				1
Franklin	4	1	1	6	7	19	1,529									3	1	1	1		3		3			1			1
Frelinghuysen			2	3	3	8	1,042					1			1		1	1	2		1	1							
Greenwich	2	1	1	7	6	18	2,554					1				1		2	4	1		1	2		2	1			1
Hackettstown	10	5	2	15	15	48	2,502			2			2		1	1		5	4	3	3		5		1	1			4
Hardwick	2			2	1	5	583										1	1			1								
Harmony	2	3	1	4	4	14	1,350			1					1				3	1		1							
Hope	8	5	1	8	6	28	1,569						1			3	1	3	3	5	1	1	1			1		1	2
Independence	1	1	1	7	3	13	1,018									1		1		1	1	1	1	1		1			2
Knowlton	2	1	2	3	8	17	1,476					2	1		1		2	1			1		2		1				1
Lopatcong	5	1	6	4	7	23	1,591		2	1		2				5	1		4				3						
Mansfield	4		3	8	13	27	1,709			1		1	1			1	2	6	4	2	2		3		1	1			1
Oxford	17	16	10	19	16	81	4,594		2	2		3				4	3	3	24	8	5	1	3		3				5
Pahaquarry				1	2	3	418												1			1							
Phillipsburg	39	34	9	34	21	147	7,181	20.46	1	3		6	2		21	17	7	7	11	9	3	1	13		3	1		1	6
Pohatcong	5	3		11	3	20						1				3		2	2	1	2	1	2			1			2
Town of Washington	4	2	6	5	6	36	2,142					2			2	3	1	1	1	3		2	3		1				1
Washington	9	3	6	12	7	25	1,452			1		4				4	2	1	3	2	1	2	4					1	5
Totals	119	84	55	176	147	591	36,589	16.15	7	11		27	7		29	49	28	37	74	39	28	17	50	1	17	8		4	35

Death-rate per 1,000, without cities of over 5,000 population, 15.09.

COMMENTS ON SPECIAL DISEASES.

While the returns, both of marriages and births, for the last year show an increase over those of the previous years, there is a considerable decrease of the number of deaths from the record of the former year, which was one of an exceptional amount of serious diseases. We confine this article to Comments on Special Diseases.

Remittent Fever. The comparison of this year with the former year, of city with country, furnishes some important evidence as to remittent fever. It is, first of all, to be borne in mind, that no other death record represents so large an aggregate of sickness, in proportion to the number of deaths, as does this fever. It stands for hundreds of cases of it that recover—for thousands often of the milder cases of intermittent fever, and of chills and fever, as well as for many neuralgic maladies, and a general malaisé traceable to the same cause. As one reads and compares these statistics with local reports, it is constantly evident that the disease is not a freak of nature, but the result of abnormal decay, chiefly of vegetable matter in undrained lands and immediate favoring circumstances of stagnation and heat. The summaries of local reports shows many instances in which great improvement has followed proper drainage, and many more where the need thereof is fully realized. We have some effective drainage laws upon our statute book, and there is great need that the life-saving advantage of thorough drainage be more fully realized. Important discussions, which have taken place the past year, not only confirm former views as to the relation of marshy or paludal localities to these periodic fevers, but also give prominence to two other views, viz., that in such districts the drinking-water often becomes the vehicle of the exciting cause; and, next, that the condition of warmth in which new cellars and the close ground vicinage of houses is often kept gives us such local conditions as correspond to summer

heat, moisture and decomposition, and so are making winter chills and winter remittents more common.

Typhoid Fever. While information of local outbreaks of typhoid fever of large extent have not reached us the last year, local and circumscribed outbreaks, clearly traceable to local causes, occurred in Beverly, Trenton, Bridgeton, Chambersburg, Paterson, Passaic, Camden, Asbury Park and Ocean Grove. But the noticeable fact is that the disease is quite diffused throughout the State, almost every county and nearly all of the cities showing many cases.

It is so certainly a result either of bad sewage or fœcal accumulations, or else of the direct conveyance of the poison from the secretions of those who have had the disease, that it is not to be looked upon as a result of any general cause, but as a fatal fever directly resulting from insanitary conditions. The cases late in the season, at Asbury Park, occurred in the very houses long before complained of, and before there was active response to the orders of the local Board of Health. The steady increase of this disease in the State is certain unless the greatest vigilance is used by local Boards of Health in promoting and securing the best conditions for the removal of animal secretions and decomposing animal matters from around human habitation. Added to this must be the most accurate precautions as to the disposal of all secretions, clothing, etc., about the sick, lest these, through drinking-water or other vehicles, shall carry the poison to those who are healthy and in healthy homes.

Small-pox. We have reason to rejoice in a great decrease of death-rate from this cause. It will not be sustained unless the increased attention given the last two years to vaccination is kept alive. School Boards, parents and Boards of Health must not neglect this matter. Full details are presented in the valuable articles on this subject, in the last report and in the two small-pox circulars of the Board. We have had some most satisfactory instances of the intelligent supervision and promptness of local Boards by which single cases have been prevented from starting an epidemic.

Scarlet Fever continues to be the great dread of mothers and the destroyer of very many valuable lives, especially between the ages of five and twelve. In a single township (Tewksbury, Hunterdon county), 150 cases and about 20 deaths are reported. The restriction which

has been made as to this disease is manifest where physicians and friends are on the alert early, with methods of isolation, disinfection and a proper care that the peeling off of the scarf skin is either prevented from mingling with the air, by oiling, or quickly disposed of by frequent bodily washings. The remarks as to it, in the last report, can be borne in mind without repetition here.

Measles. This is one of the diseases so communicable that comparatively few escape it. Its fatality during our civil war and sporadic instances of severe local epidemics show that in favoring climatic conditions and amid unfavorable circumstances of care and nursing, it may become a rapidly destructive disease. Still oftener does it cause such impairment of lung tissue as manifests itself in early manhood or womanhood, with symptoms of pulmonary disease. While the same strict rules of isolation and of prohibition from public schools as are applied to scarlet fever and some other contagious diseases, are not often enforced as to it, yet the type should be carefully noted and all cases receive careful attention at the outset. It has prevailed very extensively in many parts of the State, but not with a large proportionate mortality.

Rötheln. This is a disease so similar to measles as often to be known as German measles, and scarcely distinguishable in eruption from the other.

Two circumscribed epidemics of it were the past year recorded in the State, the one in Chester township, Burlington county, and the other at Atlantic City. One death is reported. As a rule, it is only of interest because its diagnosis from measles is so difficult.

Whooping Cough. We noticed in the last report, that for three years in succession, this had registered a higher mortality than measles. This year we have from it 189 deaths. It is a disease from which recovery would be almost universally the rule if its spasmodic symptoms were at once met by appropriate treatment. The carelessness of parents, or too much reliance on domestic remedies, is the more usual cause of the fatality. In order to prevent the spread of the disease, the sputa should not be received upon handkerchiefs to be carried in the pocket, but into some forms of disinfectant fluid. Changes of temperature must be carefully guarded, as it so easily passes into a suffocative catarrh, or causes bronchial disease.

Influenza, or a form of catarrhal fever, records a very few deaths in the State. But associate evidence from reports, and from medical practitioners, show that it prevailed very extensively in the State last winter and spring. It was especially prevalent in Atlantic, Burlington, Camden, Cumberland, Mercer, Hunterdon and Morris counties. In Middle Valley, Morris county, it affected nearly the whole population; and, in general, through the parts of the State affected, showed a progress, an extent, and a universality that easily identified it as being of the climatological form of that disease which, under various names, has traveled over States and continents, and subjected multitudes to its influence. It is especially worthy of note as interfering with labor, as sometimes affecting all mucous membranes, and as to be mitigated and even sometimes prevented by remaining indoors until the influence has passed by. So far as known it does not, like many of the zymotic diseases, depend much on local conditions. Yet, as the very young or the old frequently succumb to it, it needs much earlier attention than is usually given to catarrhs.

Croup and Diphtheria. We had occasion in the last report to trace an increase from 1873, in 1879–80, to 1,728, in 1880–81, and to 1,472, in 1881–82. The record for the year is 1,146. In the Town of Union, Hudson county, in a population of 5,849, it caused this year 52 deaths, and the year before 47.

While a majority of the cases occur in the city, it is also a disease very common in rural districts. Unlike small-pox, or measles, or scarlet fever, it seems to arise without antecedent cases from favoring local conditions. It is now believed that it is sometimes conveyed by water and by milk kept in improper milk cellars. Stagnant dampness in confined places and some forms of vegetable decay have in many cases been closely associated with it. Parents are becoming better informed as to the need of early medical advice, and as to the necessity of constant dilution of the impure air in rooms where children are sick therefrom. It is chiefly in confined localities that it takes on a virulent form.

Diarrheal Diseases. The connection of these with wrong food, bad air, impure water and poor milk is fully certified.

Young children that are allowed, in summer, to eat of all table dishes and of various kinds of fruit and confectionery at unseasonable times, are frequently its victims. In cities it is often desirable to use

water that has first been boiled and then poured from one pitcher to another for aeration, and made moderately cool with ice. In the country, wells are apt to become low in summer, and the quality of the water is such as to need similar treatment. Our last report contained a valuable paper on the various forms of artificial food. Some of these are valuable, but others directly injurious to young children. It is often, too, the case that children are overfed, and so an irritable condition of the mucous membrane is produced. The necessity of second summer sickness is taken entirely too much for granted. Where the transition from milk diet is to plain, well-cooked food in moderate supply, we rarely find this effort of nature to rid itself of unwholesome foods or drinks.

Consumption and Acute Lung Diseases. The study of pulmonary diseases can never diminish in importance so long as many thousands die each year therefrom. It is easy to see from our records the effects of such occupations as those of the potter, the hatter, etc. Also, that most of the dust trades and occupations count many victims. Nor is it surprising that many die therefrom in the open country, and especially females. Indoors work in damp houses, or the steam of the laundry and the kitchen, and the chill of the cellar, too often give sudden alternations of temperature. In many of our farm houses there is need of consulting more closely the health of those who labor indoors, and of providing the best and easiest methods of work. We look with much expectation to the diminution of this disease in the State, because the advantages of change of climate within our own borders are coming to be understood.

Brain and Nervous Diseases. These, both in the young and adult life, cause a great mortality. But there is a marked contrast between the brain and nervous diseases of adults and those of children. With adults, many result from excessive toil, and from an overstrain of the heart and circulatory system. With children, bad modes of sleeping, exposure to great heat, and especially the direct rays of the sun, and irritation of the stomach and bowels often are declared in this way. Forced study, or worry over books, is sometimes a cause. The little nervous ailments of children are too often overlooked. Many a convulsion is followed by no subsequent treatment. A single attack, or a few attacks, can often be prevented from becoming habitual or resulting in epilepsy or idiocy, when it is afterward difficult or impos-

sible to interrupt the tendency. Many cases, functional at first, thus become organic and incurable, and add to our dependent and afflicted population. There is great need that physicians be more impressed with the necessity of attending to children after a convulsion, and of cautioning the parents not to allow repetitions to take place, but to keep the child under medical supervision and treatment.

Diseases of the Heart and Circulation are not only common in old age or with those exposed through life to great business excitements, but occur also in the young, or as a result of such exposures as induce rheumatism. By early and active treatment, and by the use of salicylic acid and alkalies, many cases of rheumatism are prevented from seizing upon the valvular structure of the heart. It is a fact that heart diseases are prevented or ameliorated by care and hygienic conditions more than formerly, and thus many lives are prolonged.

Urinary Diseases. These, while grouped together, are distinguished in office tables. A large proportion of them are such as affect the kidney as a secreting and separating organ. Alcohol, the use of sharp condiments and other errors of alimentation and digestion, record their effects upon this excretory apparatus. Disease attacks its structure with comparative rareness, unless it has been subjected to very unfavorable conditions.

Adult Brain and Spinal Diseases seem to be on the increase. Whenever the nervous system is subjected to early irregularities or is overtaxed in middle life, it is apt to show itself in an early embarrassment of some part of this intricate structure. The number of imperfect or shortened lives past middle life are thus multiplied and much power abstracted from the years which would otherwise give both comfort and vigor for labor.

Erysipelas is becoming more and more an important study. Many facts seem to classify it as a specific disease of a zymotic character and to show that it frequently takes on the virulence of an infectious disease. There are so many evidences that it is inoculable and is apparently carried by contagion that great care is to be exercised as to it.

Its undoubted relation as a conveyor or excitant to puerperal fever makes it very certain that the medical practitioner or the nurse may

not pass from cases of this disease to those in child-bed, without the most precise and cleanly precautions. Since so much of this attendance is rendered by women, they need to know how precious lives are endangered unless all precautions are taken.

Puerperal conditions and diseases need the most careful guard. The loss of mothers, and especially if dependent children are left, means more to the State than is generally supposed. It is for this reason that some governments provide maternities, in order that the risks of loss may be diminished and that the poorer classes may be assured of skilled attendance.

Cancer, as a disease, seems on the increase. The returns for this year show 461 cases. While certain organs are especially prone to this degeneration, it is probable that some small and benign tumors or some forms of localized skin fissures and irritations are forced into a malignant type. The disease is being made more and more a subject of close investigation, and it is to be hoped that preventive care will accomplish more than has yet been accomplished by medicinal means.

Accidents. The constant increase of *accidents* should attract public attention. Drowning, accidents by fire-arms, by railroads and by machinery are more often the result of carelessness than of some unavoidable catastrophe.

There should be laws of prohibition as to bathing and fire-arms, applicable to minors. Machinery in factories should be more fully protected and strict inquiries be made into all other forms of accident. This very watchfulness is a great preventive.

The space at command has required brevity in this summary, but as the record of this year will form a part of the quinquennial record just tabulated, to be more fully analyzed in the next report, there is not so much need of details here. As the tables advance in number of years and in completeness, they lead us to important facts as to localities and greatly aid in the estimates of methods for the promotion of public and private hygiene. This means better and stronger lives, which add alike to the comfort of the citizens and the capital of the State.

QUINQUENNIAL TABLES.

Statement of Marriages, Births and Deaths, including all Supplements, for the five years ending June 30th, 1883.

Cities of over 5,000 Population not included in the Counties.	M.	B.	D.	Population 1880.	Death-rate.
Atlantic County	457	1,404	1,122	13,227	16.96
Atlantic City	200	491	611	5,477	‡22.31
Bergen County	964	3,447	3,044	36,786	16.55
Burlington County	1,356	4,206	3,292	42,832	15.37
Bordentown	236	623	444	5,334	16.65
Burlington City	284	675	692	7,237	19.12
Camden County	433	1,685	1,598	15,936	20.06
Camden City	2,057	3,690	4,391	41,659	21.08
Gloucester City	184	695	481	5,347	17.99
Cape May County	365	1,076	657	9,765	13.46
Cumberland County	742	1,998	1,567	21,305	14.71
Bridgeton	515	1,108	778	8,722	17.84
Millville	407	1,173	760	7,660	19.84
Essex County	1,039	4,130	2,963	40,214	14.74
Newark	6,194	18,931	16,051	136,508	23.52
Orange	542	2,103	1,293	13,207	19.58
Gloucester County	869	3,146	2,066	25,886	15.96
Hudson County	336	1,519	2,317	14,104	§32.86
Bayonne	273	1,165	896	9,372	19.12
Harrison	142	687	698	6,898	20.24
Hoboken	1,468	4,285	3,960	30,999	25.68
Jersey City	4,532	8,497	14,647	120,722	24.27
Town of Union	324	801	780	5,849	26.98
Hunterdon County	1,300	3,668	2,662	38,570	13.80
Mercer County	625	1,947	1,980	22,714	17.43
Chambersburg	176	665	554	5,437	20.38
Trenton	1,607	2,983	3,043	29,910	20.35
Middlesex County	1,019	3,614	2,830	35,120	16.12
New Brunswick	697	2,183	1,778	17,166	20.71
Monmouth County	2,276	5,840	4,793	55,538	17.26
Morris County	1,354	4,427	3,737	44,024	16.98
Morristown	212	604	657	6,837	19.22
Ocean County	478	1,611	1,010	14,455	13.97
Passaic County	401	913	822	11,297	14.55
Passaic City	298	1,089	670	6,532	20.51
Paterson	2,491	7,145	6,206	51,031	24.32
Salem County	573	1,960	1,503	19,523	15.40
Salem City	237	494	485	5,056	19.18
Somerset County	835	2,556	2,141	27,162	15.76
Sussex County	885	1,533	1,732	23,539	14.72
Union County	260	1,155	1,039	12,762	16.28
Elizabeth	1,062	3,789	2,773	28,229	19.65
Plainfield	261	856	663	8,125	16.32
Rahway	288	577	704	6,455	21.81
Warren County	1,092	3,197	2,343	29,408	15.93
Phillipsburg	329	1,164	653	7,181	18.19
Totals	42,698	*121,408	†109,906	1,131,117	19.43

* In the Birth Record, all Cities which have increased to 5,000 population, are still with their Counties, as originally recorded.

† Total additional Still Births for five years, 7,195. ‡ See note, page 349. § See note, page 357.

Total Averages for the State for five years—Persons married to 1,000 persons living, 15.10; persons born to 1,000 persons living, 21.47; persons deceased to 1,000 persons living, 19.43.

Summary of Vital Facts as to Occupations, from New Jersey Marriage Record, for Five Years ending June 30th, 1883.

NOTE.—These Tables include the Marriages for Five Years, as to which the Facts here Recorded are Given.

	Cultivator of ground.	Water employe.	Railroad employe.	Laborer.	Baker.	Barber.	Blacksmith.	Brewer.	Brick layer.	Butcher.	Cabinetmaker.	Carpenter and Joiner.	Carmaker.	Cigarmaker.
Atlantic County	84	92	17	81	2	2	5	2	......	5	3	27	......	8
*Atlantic City	12	8	11	16	2	3	2	......	......	......	2	15	......	......
Bergen County	217	11	26	134	6	8	18	......	......	12	1	36	3	4
Burlington County	531	56	23	203	10	11	19	......	4	16	2	85	6	1
Bordentown	56	12	13	26	2	1	3	......	1	2	1	7	2	3
Burlington City	69	1	11	34	3	2	3	......	5	3	......	5	3	1
Camden County	201	6	11	43	3	......	7	1	......	2	1	13	......	......
Camden City	176	97	95	200	17	21	37	2	11	20	7	58	10	16
Gloucester City	12	5	5	47	2	2	3	......	3	1	......	7	......	2
Cape May County	90	76	6	35	4	......	4	......	1	3	......	19	......	19
Cumberland County	268	125	9	62	......	3	18	1	2	4	2	14	1	......
Bridgeton	119	32	9	70	4	5	4	......	......	4	......	7	3	5
Millville	34	42	7	42	2	4	11	......	......	2	......	6	......	6
Essex County	100	3	38	90	7	3	15	2	......	15	2	63	3	4
Newark	159	32	164	364	111	75	80	84	7	140	24	218	16	75
Orange	22	1	16	58	1	4	4	......	......	7	1	22	1	8
Gloucester County	319	10	14	84	2	6	16	......	......	8	2	28	2	3
Hudson County	18	5	8	34	11	5	4	2	3	7	1	14	1	6
Bayonne	5	12	11	84	1	......	......	......	......	2	......	8	......	1
†Harrison	1	......	3	9	1	1	......	......	1	2	......	2	1	1
Hoboken	24	73	71	152	26	13	11	6	2	43	15	84	2	30
Jersey City	103	152	281	486	42	37	38	7	5	80	17	145	6	41
‡Town of Union	5	3	6	15	5	5	4	5	......	6	2	1	4	5
Hunterdon County	664	3	53	106	3	7	26	......	1	4	3	37	7	2
Mercer County	281	1	17	89	7	1	8	......	1	8	2	18	4	3
§Chambersburg	4	......	1	22	3	......	......	......	......	......	1	5	1	......
Trenton	141	4	45	206	26	23	28	2	6	24	3	38	3	14
Middlesex County	242	51	54	184	6	5	19	1	1	18	......	61	2	2
New Brunswick	69	37	25	129	7	2	3	......	......	16	......	28	......	1
Monmouth County	748	137	68	270	14	9	37	1	......	25	2	105	9	4
Morris County	319	11	78	141	4	4	46	......	......	16	1	38	4	2
Morristown	36	......	7	24	3	......	6	......	1	1	......	12	2	......
Ocean County	150	67	13	76	1	1	6	......	......	2	......	26	......	1
Passaic County	122	......	10	80	3	1	12	......	......	4	......	19	1	......
‖Passaic City	10	......	5	52	......	......	5	1	......	6	......	6	4	3
Paterson	86	10	50	312	23	24	63	7	10	48	5	102	3	10
Salem County	392	24	8	67	2	3	8	......	3	13	......	13	......	1
¶Salem City	51	1	2	16	......	......	1	......	1	2	......	3	1	3
Somerset County	311	4	28	101	2	7	15	......	......	15	2	29	3	4
Sussex County	372	5	49	98	3	4	16	......	2	10	1	29	1	......
Union County	51	......	10	21	......	......	1	......	......	3	1	9	......	1
Elizabeth	36	37	47	169	8	6	16	......	......	17	5	42	......	3
Plainfield	18	......	7	22	2	1	5	......	......	8	......	16	......	......
Rahway	24	1	12	25	2	3	4	......	......	2	1	14	6	2
Warren County	423	11	52	112	3	5	25	......	......	14	4	24	9	3
Phillipsburg	46	5	60	67	1	2	3	......	......	1	1	9	......	2

* Atlantic City, included with county for years 1878–79 and 1879–80.
† Harrison, included with county for years 1879–80.
‡ Town of Union, included with county for years 1879–80.
§ Chambersburg, included with county for years 1878–79, 1879–80 and 1880–81.
‖ Passaic, included with county for years 1878–79 and 1879–80.
¶ Salem, included with county for years 1878–79.

Summary of Vital Facts as to Occupations, from New Jersey Marriage Record, for Five Years ending June 30th, 1883.—Continued.

NOTE.—These Tables include the Marriages for Five Years, as to which the Facts here Recorded are Given.

	Clergyman.	Clerk and bookkeeper.	Cooper.	Dentist.	Druggist.	Editor.	Furnaceman.	Glassmaker.	Grocer.	Harnessmaker.	Hatter.	Innkeeper.	Jeweler.	Lawyer.
Atlantic County	......	10	1	......	3	1	......	16	6	......	......	2	......	......
*Atlantic City	......	4	2	......	......	......	......	2	2	1	......	5	1	1
Bergen County	1	87	......	......	1	3	......	1	9	1	2	9	5	11
Burlington County	6	37	......	1	5	2	......	1	2	2	......	6	1	4
Bordentown	1	10	......	......	2	......	......	1	......	1	......	......	1	2
Burlington City	2	8	1	1	1	1	......	......	2	1	......	2	1	......
Camden County	3	17	......	......	......	......	1	12	1	......	2	......	......	2
Camden City	10	179	4	4	15	5	......	18	28	7	11	21	6	14
Gloucester City	......	8	1	......	1	......	......	......	......	......	......	3	......	1
Cape May County	5	16	......	......	......	......	......	3	1	......	......	2	1	......
Cumberland County	6	23	......	1	4	2	......	17	1	1	......	1	......	1
Bridgeton	1	23	2	1	3	......	......	59	4	2	......	......	1	3
Millville	1	15	......	1	1	......	......	113	1	......	......	......	......	2
Essex County	6	108	......	5	9	4	......	1	15	3	71	7	11	15
Newark	17	506	19	12	38	4	......	4	73	66	295	63	215	26
Orange	1	31	......	3	2	1	......	......	6	......	184	4	......	6
Gloucester County	5	29	2	1	5	......	......	76	7	5	......	2	4	1
Hudson County	1	33	2	1	......	1	1	2	2	......	......	2	......	......
Bayonne	1	20	9	3	......	......	......	......	2	1	......	1	1	2
†Harrison	......	2	......	......	......	......	......	......	1	1	......	1	2	......
Hoboken	......	178	11	2	5	3	......	1	26	1	2	25	16	8
Jersey City	9	554	15	8	28	5	......	1	62	7	6	49	41	39
‡Town of Union	......	11	3	......	3	......	......	......	5	......	......	2	1	......
Hunterdon County	4	4	......	1	5	1	......	......	2	4	1	2	4	13
Mercer County	7	37	......	......	5	......	......	......	3	......	1	6	2	5
§Chambersburg	......	3	......	......	......	......	......	......	1	......	......	1	......	......
Trenton	5	106	6	7	7	......	......	......	14	2	1	17	7	13
Middlesex County	7	59	1	1	4	1	......	1	5	1	3	5	2	4
New Brunswick	9	48	1	......	4	......	......	1	6	2	3	4	3	6
Monmouth County	15	135	2	5	8	3	......	......	16	14	4	8	4	19
Morris County	12	41	......	2	7	2	3	......	5	3	5	2	5	4
Morristown	2	17	......	2	5	......	......	......	3	......	......	......	1	4
Ocean County	4	19	......	......	2	......	......	......	......	2	1	2	1	1
Passaic County	1	20	1	......	......	......	......	......	2	......	2	3	......	1
‖Passaic City	......	29	......	......	1	1	......	......	4	......	......	1	......	1
Paterson	2	118	3	1	5	2	......	1	25	3	2	12	2	18
Salem County	3	12	......	......	......	......	......	14	1	2	......	2	......	......
¶Salem City	1	5	......	......	......	......	......	18	......	......	......	......	......	1
Somerset County	13	41	......	1	5	......	......	......	10	1	1	6	1	8
Sussex County	3	33	......	4	2	2	3	1	2	1	......	7	1	8
Union County	1	38	......	......	2	......	......	......	4	......	13	3	2	1
Elizabeth	3	111	1	2	9	2	......	......	15	4	5	4	7	10
Plainfield	1	33	......	......	2	......	......	......	4	2	4	......	1	2
Rahway	......	36	......	1	2	1	......	......	5	2	......	3	4	2
Warren County	10	40	3	1	6	......	......	......	1	2	1	2	......	11
Phillipsburg	......	16	......	......	3	......	1	......	2	......	......	2	1	2

* Atlantic City, included with county for years 1878–79 and 1879–80.
† Harrison, included with county for years 1879–80.
‡ Town of Union, included with county for years 1879–80.
§ Chambersburg, included with county for years 1878–79 1879–80 and 1880–81.
‖ Passaic, included with county for years 1878–79 and 1879–80.
¶ Salem, included with county for years 1878–79.

Summary of Vital Facts as to Occupations, from New Jersey Marriage Record, for Five Years ending June 30th, 1883.—Continued.

NOTE.—These Tables include the Marriages for Five Years, as to which the Facts here Recorded are Given.

	Machinist.	Manufacturer.	Mason.	Miller.	Painter.	Photographer.	Physician.	Plumber.	Police and watchman.	Potter.	Printer.	Restaurant keeper.	Shoemaker.	Stationer.
Atlantic County	4	3	4	1	4	......	2	1	1	......	3	......	12	......
*Atlantic City	2	1	......	......	8	......	1	......	......	......	......	1	1	1
Bergen County	11	11	14	3	26	......	5	4	1	......	16	......	7	......
Burlington County	35	3	5	12	21	......	12	3	1	2	8	1	22	......
Bordentown	6	2	......	2	5	......	2	......	......	5	......	......	1	......
Burlington City	4	3	4	5	8	......	3	2	......	1	3	......	40	1
Camden County	2	4	1	3	7	......	6	......	......	......	4	......	3	......
Camden City	71	13	7	2	37	5	13	8	5	4	40	22	58	......
Gloucester City	6	2	2	......	......	......	1	......	1	......	3	......	6	......
Cape May County	2	3	2	......	13	......	4	1	......	......	4	......	......	......
Cumberland County	2	3	1	5	1	1	2	1	1	1	8	2	25	......
Bridgeton	21	1	......	6	9	1	1	......	......	......	5	1	1	......
Millville	3	2	3	......	5	......	......	......	......	......	2	1	11	......
Essex County	21	14	12	......	23	......	9	6	2	......	10	......	11	......
Newark	234	51	77	5	134	7	36	35	20	4	53	7	173	6
Orange	......	5	8	1	14	......	3	7	......	......	4	......	4	......
Gloucester County	9	1	6	11	4	......	4	1	......	......	4	1	4	......
Hudson County	9	1	3	1	10	......	2	2	1	......	7	......	3	1
Bayonne	5	2	4	......	2	......	......	2	3	1	......	......	4	1
†Harrison	......	......	......	......	3	......	......	1	......	......	......	......	......	......
Hoboken	37	4	13	2	23	4	16	8	2	3	14	9	19	1
Jersey City	143	32	15	2	86	3	31	27	28	1	52	8	33	7
‡Town of Union	3	1	6	......	7	......	......	1	......	......	......	2	3	......
Hunterdon County	7	5	3	16	16	......	8	1	1	......	4	1	14	......
Mercer County	5	2	6	6	5	......	6	......	......	26	3	......	4	......
§Chambersburg	1	......	3	......	1	......	......	......	......	7	......	......	......	......
Trenton	46	14	9	5	28	4	7	9	3	204	18	4	9	1
Middlesex County	9	8	8	4	18	1	9	1	2	3	3	......	11	......
New Brunswick	22	6	2	2	12	1	4	6	2	......	6	......	20	......
Monmouth County	5	9	35	18	55	3	17	5	1	1	11	7	4	......
Morris County	17	6	13	11	22	1	12	3	......	1	11	2	7	......
Morristown	3	2	6	......	4	......	4	1	......	......	......	......	4	......
Ocean County	5	2	4	3	3	......	1	......	......	......	2	......	2	......
Passaic County	8	3	6	3	3	......	1	1	1	......	3	......	......	......
‖Passaic City	10	3	1	1	7	1	1	......	......	......	1	2	......	......
Paterson	179	13	19	5	46	2	15	18	9	......	16	1	19	......
Salem County	1	......	2	4	5	......	1	......	......	......	3	1	4	......
¶Salem City	2	......	......	......	3	......	1	......	......	1	......	......	......	......
Somerset County	10	7	7	6	3	1	10	2	1	3	3	1	2	......
Sussex County	6	1	9	10	5	......	6	1	1	......	3	......	10	......
Union County	5	1	4	......	7	......	3	......	2	......	2	......	4	......
Elizabeth	73	9	9	1	23	......	3	4	4	3	5	1	3	1
Plainfield	6	3	2	......	2	......	3	1	......	......	......	1	......	2
Rahway	8	8	4	......	11	1	3	1	......	1	2	......	1	......
Warren County	10	7	2	18	12	......	8	......	......	......	4	1	3	......
Phillipsburg	6	3	2	2	6	......	......	2	......	1	4	......	......	......

* Atlantic City, included with county for years 1878–79 and 1879–80.
† Harrison, included with county for years 1879–80.
‡ Town of Union, included with county for years 1879–80.
§ Chambersburg, included with county for years 1878–79, 1879–80 and 1880–81.
‖ Passaic, included with county for years 1878–79 and 1879–80.
¶ Salem, included with county for years 1878–79.

Summary of Vital Facts as to Occupations, from New Jersey Marriage Record, for Five Years ending June 30th, 1883.—Continued.

NOTE.—These Tables include the Marriages for Five Years, as to which the Facts here Recorded are Given.

	Stone cutter.	Surveyor and civil engineer.	Tailor.	Tanner.	Teacher.	Telegrapher.	Tobacconist.	Weaver.	Wheelwright.	Worker in S. W. & C.	Other trades.	Merchant.
Atlantic County	......	......	5	1	2	3	2	3	3	8	37	15
*Atlantic City	......	1	......	......	......	......	......	1	......	......	33	7
Bergen County	2	2	2	......	12	8	1	13	3	10	108	48
Burlington County	......	......	......	2	7	7	......	2	5	3	100	51
Bordentown	2	......	1	......	1	3	1	1	......	......	37	6
Burlington City	3	......	......	......	......	......	1	......	1	1	42	4
Camden County	......	......	......	......	4	2	......	4	4	......	31	15
Camden City	8	5	8	......	1	10	6	20	9	9	305	112
Gloucester City	......	......	......	......	......	......	......	11	......	3	80	6
Cape May County	2	......	......	......	6	1	1	......	2	......	27	16
Cumberland County	1	......	2	......	8	1	......	......	4	......	42	34
Bridgeton	3	......	1	......	2	......	1	1	1	1	56	19
Millville	......	......	2	......	1	......	1	1	......	3	69	93
Essex County	3	2	3	3	10	......	3	10	3	4	147	82
Newark	44	8	149	92	24	14	6	11	7	14	1281	256
Orange	1	1	3	......	1	1	2	......	......	1	68	23
Gloucester County	2	......	......	......	8	2	......	5	8	......	57	37
Hudson County	4	......	2	1	3	1	......	3	......	15	63	26
Bayonne	......	......	1	......	1	......	......	......	......	......	25	21
†Harrison	1	......	......	......	......	......	......	......	......	......	16	1
Hoboken	1	1	13	1	7	3	3	5	2	9	239	119
Jersey City	13	10	29	......	13	23	12	19	2	11	599	363
‡Town of Union	6	......	13	......	1	......	......	12	1	16	58	9
Hunterdon County	2	1	1	1	21	13	......	1	7	1	83	51
Mercer County	2	1	......	2	11	6	3	2	5	2	55	31
§Chambersburg	......	......	2	......	......	......	......	......	......	......	19	......
Trenton	4	1	12	2	5	10	2	4	3	4	297	59
Middlesex County	2	2	1	......	1	11	4	1	......	......	86	58
New Brunswick	2	2	5	......	1	12	......	1	......	7	92	24
Monmouth County	......	8	9	......	10	7	2	1	7	1	165	99
Morris County	2	......	1	......	16	6	......	3	4	......	329	57
Morristown	1	1	......	......	......	1	......	......	......	......	23	9
Ocean County	......	2	1	......	8	3	......	5	......	......	24	23
Passaic County	1	......	......	......	1	......	......	7	1	2	49	15
‖Passaic City	......	......	......	......	1	......	......	8	......	6	57	8
Paterson	5	2	15	3	7	15	1	177	2	321	445	60
Salem County	1	......	1	......	2	4	1	1	3	......	27	15
¶Salem City	1	......	......	......	......	1	......	......	......	......	17	7
Somerset County	3	3	1	......	6	5	2	22	2	2	87	38
Sussex County	2	......	1	......	15	1	......	1	4	2	87	37
Union County	......	......	7	......	4	2	......	......	......	1	80	18
Elizabeth	3	......	8	6	4	8	1	1	......	6	177	51
Plainfield	......	1	3	1	1	2	......	......	......	......	60	16
Rahway	......	......	5	......	2	3	1	......	2	2	47	11
Warren County	3	2	5	3	13	10	1	......	2	......	136	45
Phillipsburg	1	1	......	......	......	......	......	......	......	......	48	11

* Atlantic City, included with county for years 1878-79 and 1879-80.
† Harrison included with county for years 1879-80.
‡ Town of Union, included with county for years 1879-80.
§ Chambersburg, included with county for years 1878-79, 1879-80 and 1880-81.
‖ Passaic, included with county for years 1878-79 and 1879-80.
¶ Salem, included with county for years 1878-79.

Summary of Vital Facts from New Jersey Birth Record for Five Years, ending June 30th, 1883.

NOTE.—These Tables include the Births for Five Years, as to which the Facts herein stated are given. In three instances, viz.: in Atlantic City and Salem City, for two years, and in Passaic City, for one year, the Births of the Cities are included with their respective Counties.

	Male.	Female.	Previous children.	Number living.	Native father.	Foreign father.	Native mother.	Foreign mother.	Mixed parentage.	Black.	Population, 1880.
Atlantic County	803	751	4,480	3,405	1,262	277	1,321	227	132	18	13,227
Atlantic City	172	135	832	600	275	27	283	26	17	21	5,477
Bergen County	1,700	1,659	9,676	7,509	2,127	1,226	2,207	1,078	423	116	36,786
Burlington County	2,112	1,929	10,624	8,340	3,655	333	3,776	270	176	111	42,832
Bordentown	295	302	1,777	1,316	492	107	506	75	61	26	5,334
Burlington City	303	309	1,546	1,198	491	41	587	34	26	55	7,237
Camden County	827	830	4,488	3,373	1,435	196	1,517	139	134	177	15,936
Camden City	1,845	1,750	9,103	6,562	2,692	619	3,046	455	358	167	41,659
Gloucester City	348	343	1,957	1,433	456	226	487	201	155	....	5,347
Cape May County	545	495	2,734	2,176	998	26	1,026	23	30	66	9,765
Cumberland County	1,039	901	5,090	4,024	1,738	176	1,793	143	101	79	21,305
Bridgeton	556	533	2,584	1,967	984	100	1.017	76	43	71	8,722
Millville	591	573	3,203	2,436	1,084	112	1,078	83	57	6	7,660
Essex County	2,038	2,013	11,044	8,652	2,524	1,424	2,808	1,260	626	81	40,214
Newark	9,353	8,858	57,494	43,648	8,001	9,160	9,330	7,663	3,129	258	136,508
Orange	1,072	1,017	6,880	5,378	926	1,159	1,017	1,078	388	70	13,207
Gloucester County	1,617	1,490	8,130	6,350	2,721	357	2,879	232	213	132	25,886
Hudson County	725	680	4,700	3,331	533	843	649	731	241	1	14,104
Bayonne	505	422	3,014	2,251	336	586	384	536	148	4	9,372
Harrison	300	363	2,102	1,489	326	337	330	331	118	....	6,898
Hoboken	1,864	1,912	12,624	8,707	970	2,780	1,308	2,343	708	4	30,999
Jersey City	3,775	3,561	22,982	15,706	3,084	4,144	3,622	3,644	1,458	62	120,722
Town of Union	399	355	2,609	1,897	203	545	281	464	153	....	5,849
Hunterdon County	1,775	1,713	9,059	7,408	3,263	290	3,374	214	129	34	38,570
Mercer	1,167	1,089	5,905	4,548	1,675	514	1,757	406	217	162	22,714
Chambersburg	163	152	1,010	761	150	171	166	154	43	1	5,437
Trenton	1,526	1,411	7,357	5,623	1,884	1,009	2,125	805	446	83	29,910
Middlesex County	1,763	1.679	9,103	7,064	2,304	1,203	2,396	1,037	372	70	35,120
New Brunswick	1,078	1,044	6,346	5,095	1,379	719	1,518	591	337	49	17,166
Monmouth County	2,966	2,771	14,852	12,588	5,007	692	5,177	592	398	222	55,538
Morris County	2,247	2,075	12,961	10,212	3,122	1,191	3,293	1,040	487	67	44,024
Morristown	281	288	1,476	1,205	431	131	435	129	57	21	6,837
Ocean County	815	753	4,623	3,735	1,498	83	1,485	86	39	8	14,455
Passaic County	562	534	3,287	2,599	811	382	831	265	143	18	11,297
Passaic City	453	434	3,002	2,198	349	528	380	507	201	17	6'532
Paterson	3,670	3,386	21,164	14,930	2,839	4,239	3,210	3,741	1,401	70	51,031
Salem County	1,105	984	5,306	4,288	1,969	98	2,042	75	56	163	19,523
Salem City	164	155	995	846	298	20	309	12	10	21	5,056
Somerset County	1,289	1,222	6,854	5,671	2,006	487	2,190	335	263	148	27,162
Sussex County	785	699	3,770	3,028	1,346	139	1,403	89	80	4	23,539
Union County	578	531	3,378	2,727	734	364	802	296	143	28	12,762
Elizabeth	1,954	1,838	11,186	8.541	1,792	2,000	2,070	1,663	743	47	28,229
Plainfield	440	409	2,416	1,844	616	218	648	197	84	63	8,125
Rahway	260	272	1,488	1,161	422	124	441	109	64	36	6,455
Warren County	1,606	1,638	8,315	6,634	2,706	398	2,841	322	151	29	29,408
Phillipsburg	573	578	3,647	2,874	878	262	975	185	124	....	7,181

Summary of Vital Facts from New Jersey Death Record, by Counties, for Five Years ending June 30th, 1883.

COUNTIES.	DEATHS AT ALL AGES.					PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Atlantic	426	283	128	445	433	4	34	11	26	4	24	94	255	228	137	120	89	54	147	15	107	42	8	19	27
Bergen	596	454	286	889	736	94	50	6	97	11	25	100	254	406	373	241	200	102	201	16	136	68	5	35	87
Burlington	907	629	383	1,234	1,295	49	137	16	60	17	47	195	417	695	390	276	289	143	357	24	245	99	16	55	56
Camden	1,578	966	678	1,859	1,192	81	249	158	193	11	57	246	801	887	584	484	318	141	429	17	224	122	10	65	80
Cape May	151	72	59	148	196	7	31	......	15	2	10	25	72	75	56	47	21	15	66	3	39	26	3	4	9
Cumberland	656	478	321	800	823	9	132	1	90	18	19	204	316	488	318	214	184	85	220	15	154	56	8	24	47
Essex	4,707	3,497	2,039	6,381	3,472	330	554	26	945	128	201	1314	1,986	3,002	2,424	1808	969	602	1251	104	794	392	45	228	242
Gloucester	473	247	184	570	569	30	68	9	39	7	19	80	236	305	212	130	122	43	150	11	117	44	7	13	30
Hudson	5,873	4,747	2,441	7,357	2,730	392	554	351	968	188	177	1436	2,785	2,845	2,574	2348	954	590	983	97	827	532	47	257	498
Hunterdon	415	252	251	677	1,008	37	75	1	66	9	17	122	198	315	248	107	211	85	310	19	141	76	11	33	51
Mercer	1,140	650	511	1,807	1,290	51	138	23	174	19	35	206	545	917	523	312	264	145	492	38	283	135	24	57	95
Middlesex	1,038	623	480	1,357	1,047	81	106	12	128	14	51	251	522	623	484	273	222	164	244	20	218	108	11	36	124
Monmouth	1,096	580	416	1,188	1,288	39	90	6	95	8	52	182	583	649	443	280	314	177	386	14	266	101	16	46	118
Morris	802	599	434	1,269	1,155	116	78	......	185	24	37	168	331	538	569	287	249	127	471	24	189	81	31	62	106
Ocean	207	108	96	302	271	3	28	1	17	1	13	50	89	175	91	62	45	16	77	6	69	16	5	15	17
Passaic	2,001	1,303	791	2,299	1,329	138	164	42	316	47	68	314	1,089	1,086	844	650	367	230	360	34	312	128	25	88	102
Salem	438	220	208	495	580	26	63	7	22	6	23	80	184	307	222	91	93	45	161	21	105	52	8	18	30
Somerset	393	223	210	586	695	50	36	3	32	12	13	110	184	259	242	109	143	78	215	14	138	50	15	25	48
Sussex	249	200	186	515	527	41	55	......	78	2	9	75	105	237	184	101	118	58	150	11	72	40	6	27	41
Union	1,164	818	514	1,508	1,134	106	92	6	174	30	49	301	544	694	606	453	275	134	325	31	209	106	11	45	112
Warren	649	442	345	791	725	37	84	10	138	15	12	172	272	346	340	216	148	76	229	21	144	41	12	33	75
Totals	24,959	17,386	10,961	32,477	22,495	1721	2818	689	3857	573	958	5719	11,768	15,077	11,864	8609	5576	3199	7247	555	4789	2115	318	1185	1990

Total deaths in the State, for five years (including supplements), was 109,906, and the average death-rate, 19.43.

Rates for short periods, or which deal with small numbers, are only approximate, and sometimes misleading, since temporary causes may have been in operation, and small numbers do not eliminate or balance errors which practically disappear in large aggregates. So, five or ten years analyses are much more important than any single year. The number of deaths before twenty, in proportion to the rest, are much more informatory as to local causes affecting health, than the total deaths. So, also, the number dying from the zymotic diseases, and especially from fevers, croup, diphtheria, diarrheal diseases, consumption, and brain and nervous diseases of children.

Summary of Vital Facts from New Jersey Death Record, in Cities of over 5,000 Population, for Five Years ending June 30th, 1883.

CITIES.	DEATHS AT ALL AGES.					PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Consumption.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Atlantic City	187	120	48	153	100	......	13	......	15	1	8	33	121	68	42	48	36	20	46	11	27	14	1	6	19
Bayonne	259	198	73	274	90	10	13	......	22	4	10	54	124	93	123	107	28	26	28	7	31	9	......	7	32
Bordentown	69	59	39	148	126	5	6	1	7	2	3	19	25	83	30	44	39	16	39	4	18	10	......	7	8
Bridgeton	177	120	90	203	195	3	36	......	22	......	9	87	85	116	80	51	54	15	50	4	42	12	2	6	15
Burlington City	115	103	72	224	176	11	13	2	7	1	8	36	54	140	63	37	47	34	55	9	31	9	3	12	12
Camden City	1,062	715	499	1,279	689	56	162	147	148	7	37	187	543	594	388	342	199	104	256	8	120	92	7	37	47
Chambersburg	152	80	75	148	80	6	22	......	29	4	7	29	67	77	60	35	16	8	29	4	29	12	3	8	2
Elizabeth	669	512	308	792	480	42	39	1	105	15	33	158	315	354	309	278	137	59	160	8	110	52	6	19	63
Gloucester City	137	56	60	143	79	5	15	......	6	4	2	16	61	81	42	46	15	7	29	1	17	5	2	8	9
Harrison	172	138	78	228	73	28	31	......	34	2	11	23	81	99	85	92	19	12	23	1	16	8	3	7	13
Hoboken	1,076	870	360	1,280	370	37	72	35	132	20	36	376	547	474	438	531	180	115	150	22	114	63	14	52	72
Jersey City	3,650	2,986	1,568	4,645	1,694	218	361	254	615	144	122	825	1774	1860	1668	1437	610	331	611	57	584	215	27	168	298
Millville	183	168	102	188	117	......	38	......	43	14	9	57	106	124	83	55	26	21	32	2	27	12	1	3	8
Morristown	106	90	52	220	194	13	6	......	8	1	9	29	62	101	75	48	33	25	109	2	25	14	2	5	11
Newark	3,753	2,872	1,637	5,151	2,470	245	374	24	778	101	143	1080	1574	2370	1857	1456	740	531	949	67	611	298	37	167	191
New Brunswick	441	271	208	491	346	19	47	9	65	12	28	114	215	243	185	121	84	73	99	11	62	50	2	7	28
Orange	331	231	127	408	187	7	22	......	51	7	21	66	130	198	201	128	51	34	61	8	35	26	......	17	14
Passaic City	214	130	69	173	90	6	19	......	19	2	10	33	106	82	71	78	37	23	22	5	19	5	3	11	14
Paterson	1,630	1,065	637	1,887	1,009	91	134	42	266	43	52	255	905	913	689	520	270	180	278	21	255	103	17	64	63
Phillipsburg	202	117	76	163	93	5	21	......	28	2	6	69	69	74	56	59	24	6	46	......	26	5	1	11	13
Plainfield	164	98	67	174	164	4	12	1	14	7	3	30	93	104	84	54	31	28	39	5	24	12	3	3	14
Rahway	130	79	59	229	202	13	9	3	27	5	4	13	56	115	96	48	44	18	53	9	39	20	1	6	7
Salem City	110	48	41	134	140	9	14	2	2	......	6	20	42	82	58	17	19	9	45	......	28	11	4	5	5
Town of Union	224	201	118	181	71	16	16	4	49	8	2	132	97	88	65	88	32	24	28	3	22	11	......	8	5
Trenton	769	395	278	1,022	599	31	66	19	116	8	15	108	324	639	282	185	135	82	210	17	143	59	15	31	48
Totals	15,982	11,722	6,741	19,938	9,831	880	1561	544	2638	414	594	3849	7576	9072	7130	5905	2906	1804	3447	286	2455	1127	154	675	1011

Cities are generally more unhealthy than their death-rates indicate, since the population is in many of them much decreased for four months in the year, and thousands remove themselves instead of removing the evils which distress and sicken those who remain. Hence, in many of our cities, the death-rate for June, July, August and September, reckoned for the remaining population, is a fair criterion of the health of locality, or at least should be considered for purposes of correction. So health laws are a great defense to all, but especially to the working classes of cities. It is a question of labor and social science and art, as well as of comfort and hygiene.

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EIGHTH ANNUAL REPORT

OF THE

BOARD OF HEALTH

OF THE

STATE OF NEW JERSEY.

1884.

TRENTON, N. J.:
JOHN L. MURPHY, STATE PRINTER.
1884.

THE STATE BOARD OF HEALTH.

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REPORT OF THE SECRETARY OF THE BOARD.

To His Excellency Leon Abbett,

GOVERNOR—In presenting to your Excellency the eighth report of the State Board of Health of New Jersey, it is gratifiying to be able to speak of the year as one of comparative healthfulness in the State. It is equally encouraging that those of most intelligence, and who have most to do with the moulding of public opinion, are more and more realizing that the health of the people is a vital consideration as to the public prosperity. It is not merely that the ravages of epidemics teach us what a burden these are upon the industrial and monetary interests of a people. Whatever of time, of money and of happy enjoyment are lost by the weariness and waste of avoidable sickness, is a tax on the welfare of all citizens, and so upon the industrial energies and contentment of the population. It is high time that the increase of our resident population and the health and the life of the people had other consideration than that which speaks of it as merely a desirable comfort to be patronized or approved. The healthy man, woman and child are the most valuable of our resources, and are to be fostered and protected with all the forethought and care with which we would guard the honor of the State, or the materials from which it derives its prosperity. They are its productive capital more than the richness of soil, the value of metals or the constructions of machinery. If there is not a vigor of life among the people, there is a constant constriction upon the power which, foremost of all, is indispensable to the development of the State. In our list of resources, families which have homes of health take the first rank. Government and law have few, if any, higher duties than to protect them from the ravages of untimely death, and from those avoidable impairments of vital force that are paralyzing in their effects on prosperity and progress. In the world, there is no value but in human life, and human life has the greatest value when healthy and moral. It is only when we can carefully examine into the health

condition of the people that we can at all realize the burdens that are pressed upon the population by avoidable diseases and untimely deaths. If we turn to the home we find that through the want of requisite information, or by reason of defective drainage, imperfect construction of buildings, or defective methods for the removal of all debris, the inmates are exposed to bad air or to taint of food or water such as must make wasteful demands on vital force, or cause actual disease. If we look into the schools we find pupils subjected to many disabilities in the very process of what we call education.

If we go into the workshop, where the laborers should have healthy surroundings and all the reasonable aids and appliance for health, we too often find that there are various insanitary conditions, and that the average effective life of the laborer is so short as to tell a sad tale of result. If we inquire into actual cases of disease, and the history of epidemics, we find that much of the sickness, suffering and fatality are the result of palpable mistakes and failures in health-care. If we look for evidences from experience to prove what can be done to relieve such conditions, to lower death-rates, and to increase human endurance, the amount of testimony is such as carries conviction to all. The veteran sanitarian, Edwin Chadwick, C. B., at a recent meeting of the Association of Public Sanitary Inspectors, in London, said: "Boston, by improvement in the house drainage, appears to have made an advance from the present common death-rate of the Italian cities, of thirty in a thousand to twenty in a thousand, or about one-third; but it may be confidently affirmed that, by a better self-government and administration of more complete plans, it might gain another third, as has Croyden, where the death-rate, which was twenty-eight in a thousand, is now thirteen in a thousand; or Dover, which was twenty-eight, and now is fourteen; or old Salisbury, with a like gain. But even of such instances, I consider that by the application of the half-time principle of mixed physical and mental training, advances may be made from the death-rates of eleven in a thousand of the children of the school stage of life, to the death-rates even of three in a thousand, obtained in the district half-time schools, or that death-rates of not more than ten in a thousand may be obtained as the average death-rate of a well-governed city. It has become evident that a constant and intelligent oversight of the public health is one of the great prerogatives of government, and so weighty a concern that it must be superintended with administrative skill. While requiring

the aid of the sciences and the professions, and the knowledge to be derived from experience, it also needs the power of the law and its enforcement under the guardianship and direction of the courts. It is encouraging to know that the period of half knowledge and painful experimentation is fast passing away, and we can now say we know the nature and extent of the work which lies before us; we know every day more fully the principles and details which should guide us in carrying it out; and, what is more, we can rely more safely and surely upon the steady growth of intelligent conviction which is rapidly influencing all classes of the community, and enlisting their services in the grand policy of prevention. In addition to the rapidly increasing information as to all sanitary matters, we are able to refer to the former reports of this Board, and to its various circulars, as containing information of much value to the citizens of the State. As being also in constant correspondence with the members of local Boards in all parts of the State, we are constantly able to give to these Boards such information as they may need for an intelligent supervision of their work. This Board is provided by the State in order that, among other duties, it may aid in the dissemination of information, and may instruct local authorities as to their duties. We subjoin herewith reference to a few of the subjects which, at the present time, seem to us most prominently to call for consideration on the part of the citizens of the State.

WATER-SUPPLY.

The importance of a pure water-supply has never been over-estimated, while the difficulties in the way of securing it are constantly multiplying. These are by no means insurmountable, but often involve considerable outlay at the start. It is an occasion for rejoicing that it is probable many of our sea-side resorts can secure a good supply by means of driven or bored wells. Where they have been put down under skilled advice as at Cape May, Ocean Grove, Asbury Park, &c., they have thus far proved successful. Other places, not too compact, depend upon the old form of well. Here the caution as to surface drainage and organic matter near at hand is better understood than formerly. But as not infrequently well-water becomes contaminated by refuse or organic matter in the soil, or pollution from about the curb or pump, the greatest care should be exercised. In some instances the best source of supply is similar to that of Prince-

ton, where advantage is taken of a few hills as a water-shed, and a series of springs are tapped for a supply. These being replenished by the constant source of rain, and the water being filtered through the ground, a good and constant supply is secured. The most serious question is that which relates to the supply of large cities, especially those which, by reason of level position or nearness to tide-water, are not likely to find an abundance of potable water near at hand. Within thirty miles of New York city is to be found half of the population of the State of New Jersey. Of this number, according to the careful and discriminating judgment of engineers, chemists, physicians and boards of health, not one-half are supplied with water fit to drink. It cannot be claimed that the unfitness of the Passaic river, as a water-supply, is any new fact, although the rapidly increasing population magnifies the greatness of the evil. Long ago the State Geologist and various local correspondents pointed to the facts in evidence. Chemists and others, who have begun investigations with the idea that the evils have been magnified, or that they could be remedied by local action, have forsaken such views. The State Water Commission and the chemist of the water boards fully substantiated views already entertained. Nor is it enough to point to the fact of no very great mortality. When so great a city as London can point to a death-rate of only twenty per thousand, and many an English town of 30,000 inhabitants, to a death-rate of only sixteen to eighteen, it will not do for us to claim that Hudson county, with an average death-rate for the whole county of 26.58, and Newark, with a death-rate of 25.49, are in a good sanitary condition. The fact is still more significant when it is remembered how largely the cities are depopulated during the summer, and how many of the deaths that occur are of that zymotic class which largely depends on local evils. No section of country within one hundred miles of New York city has more natural or business attractions that our own State. But if there is neglect of sanitary care, and especially of a good water-supply, it is too late to adopt the policy of concealment, or to point to a death-rate of, say, from twenty-six to thirty as a justification. Such a sustained death-rate in healthy times points to a fearful death-rate if pestilence broods over such nests. Besides, there are evils of sickness, of invalidity, of debility, of depression of vigor, that do not always express themselves decidedly in an increasing death-rate. Where the vigor of population is in any-

wise impaired, and the marriage-rate and birth-rate decreased, these as well as the death-rate are indices of burdens upon prosperity and upon labor, of which those resulting from avoidable disease are the most pressing. It is most noticeable how, in the larger cities of Great Britain, their merchant-princes and their great manufacturers point with pride to the water-supply. If Liverpool has its difficult health problems, it shows a delightful source of water-supply from the hills beyond. If Glasgow has a foul Clyde, it tells you that its people drink only the water of Loch Katrine, stored and filtered amid the great hills of Scotland. London, with its various water companies, is constantly on the alert as to the purity of supply, and by most extended filtering works largely makes up for deficiencies which would otherwise not be tolerated. As our risks from impure water are even more than those from ordinary impure air, it behooves our cities more and more to guard against any contamination of potable water. In the various reports of the State Geologist, and of this Board, as well as in that of the Commissioners of State Water Supply, are to be found valuable facts as to real conditions and as to available sources of water-supply. The great error in some localities has been a too hasty commitment of city interests to some incorporated company. Some of these are excellent and quickly respond to public demand when the water becomes insufficient in quantity or inferior in quality. Others, having become established and profitable investments, resist any popular outcry that requires expense, or very slowly respond to just complaints. A committee at Asbury Park, in a comparison of water-rates in places where the water has been introduced through works owned by the borough or city, found that the rates were over thirty-three per cent. in favor of consumers, as compared with those of incorporated private companies. In other instances, cities have too hastily chosen sources of water-supply on the judgment of non-expert committees, or of engineers little versed in this line of inquiry. The conditions of an efficient water-supply are now so well understood, and the resources of our State in these directions are so good, that no more blunders should occur. We must still urge upon the counties of Passaic, Essex, Union and Hudson the advisability of considering modes of a combined water-supply for the over 500,000 people they contain, and in view of the prospects of a rapidly-increasing population.

SCAVENGERING.

With all that we hear about polluted ground, sewers, etc., we are to remember that the most radical and effective way for keeping the soil clean, is not to allow uncleanliness to get into it. This means a thorough system of scavengering, so prompt as to secure the removal of decomposable or putrescible material before there is time for it to change, and of all cast-off material so that it shall not accumulate in quantities. It also is made to include the emptying of such receptacles as do not find conveyance and discharge through sewers.

Sir Robert Rawlinson, C. E., who has been so largely identified with English systems of sewerage, says: "Since the year 1848, the date of the first Public Health act, very many millions sterling have been expended on main sewerage and house draining; on establishing water works, and on street improvements. I have had something to do with the movement, and must plead guilty to some of the expenditures. I have no reason to repudiate this class of works, but I do wish to exalt something much simpler and cheaper—namely, systematic and thorough scavengering, as unless this is established and attended to, the Sanitary Engineers will, to a considerable extent, have worked in vain. On the full and proper execution of surface scavengering will depend the crowning results of modern sanitary measures. All that water can remove must be washed away; all matter liable to become putrid must be consumed by fire or promptly removed. There must be no large heaps of refuse stored or sorted to enable portions to be sold as manure. The work consists in—

1. The removal of house offal.
2. Removal of ashes and dry house dirt.
3. Cleaning of street and catch basins.
4. Cleaning of cesspools and privy vaults.
5. Removal of manure and other animal refuse.

The first is strictly the refuse from the cleaning of meats, of poultry, of fish; the scrapings and peelings of vegetables; used-up rags or house-cloths, and should be cared for quite distinctly from the dry dirt and rubbish of the house and its surroundings. As it is, much of it, putrescible matter, it needs to be gotten rid of often, especially in hot weather, and with a regularity which will never disappoint. The one essential point is that all these different matters must be regarded as so important as to require a definite and comprehensive plan for

their management." Perhaps no city in the Union has so long been successful in this respect as Boston. In the fifth report of the American Public Health Association, 1879, Eliot C. Clarke, C. E., gives a detailed description of the organization and carrying out of the system. The model should be closely studied by all of our larger cities, many of which have very imperfect plans. Asbury Park, as one of our smaller cities, but as having a rapid summer influx of population, deserves to be singled out as planning fully to carry out a system of surface cleanliness. The method for dealing successfully with all the forms of material is now well understood. If they are kept distinct the problem is greatly simplified. The swill cart gladly receives the first. The ashes and dry house dirt are available for sifting for cement or asphalt pavement, or for in-filling for low places. The street mud is of value in the surrounding country, and when of great bulk is so collected as to be reduced under pressure, as is now profitably done in Glasgow and other cities. With the various forms of excavating apparatus and the decreasing number of cesspools and privy vaults, this department can also be well conducted. The outside vaults can be cleansed by sulphur fumigation. The removal of manure and animal refuse, such as is represented by stables, pens, slaughter-houses and markets, requires active sanitary police vigilance and regularity; but this, too, can be accomplished. Water and air come grandly to our aid in dealing with all surface accumulations, if only we understand by water, not wetting, but washing away, and by airing, not merely the presence of air, but draughts and winds—such ventilation as flushes. All this is the more important, because when a pestilence breaks out it will not do to stir up all the "sleeping dogs" of disease, or to remove, amid heat and moisture, materials which ought never to have accumulated.

DISPOSAL OF ALL HOUSE WASTE.

As the sanitary condition of each house has to do with the health of its inmates, and as a pest-house, even in its most moderate definition, cannot but have effect upon localities adjoining it, or persons passing it, the healthy character of each building becomes a public concern. With the great tendency that population has to center in cities, and with the fact that over one-half of the population of New Jersey is already enclosed in cities of over five thousand inhabitants,

we cannot be too watchful as to these domiciliary conditions. So much depends upon the choice of a healthy site, the proper preparation of the ground by under-drainage, and upon the construction and material of the building, that most of the largest and most advanced cities of Great Britain, and of our own country, recognize this as too much of a public concern to be left to the option of each individual. Hence, building plans of extended alteration are now submitted to competent judges in order that it may be known that proper provision is made for the safety and health of those who are to occupy them. Thus are not only valuable suggestions secured, but impositions upon occupants are prevented, which, unless hindered in this way, they are too often powerless to prevent. We see no other plan upon which proper dwellings can be secured, and by which especially the industrial classes in towns can be protected from the most serious tax upon their industry and resources. As it is practically impossible for each householder in a city fully to provide for the removal of every form of debris, or to determine, independently of his neighbor, what plan shall be adopted, it is incumbent upon all cities and city authorities to regulate certain matters as to the disposal of all "offaling" of the household. It has long since come to be recognized that the use of a cesspool which is to receive the liquid filth of the house, and distribute it through the soil, can only be defended under certain conditions. While a proper soil and proper cultivation, and a proper distance from the house and the well, may make this tolerable in the country, it is always a questionable, and often a dangerous method, where houses join each other closely on streets, or are only separated on the rear by yards of small depths. The risk is greatest where the dependence is upon wells for water-supply, but as foul air is harmful, as well as foul water, the risk is removed only in part by reliance upon a different kind of water-supply. The resort to closely cemented cesspools is safe, but this involves so much expense in the removal of the liquid as to deter many from this method, except where there is a city system of disposal. Hence, sewers have come to be the reliance of most large cities. The proper construction of these is now so well understood, and they are now so well brought to a reasonable expense as to make their use far more extended than formerly. The great difficulty as to them now arises from two sources. Too often the house systems or inside connections are imperfect, so that more so-called sewer gas is generated in the house system than in

the main sewers. The remedies for this, also, are now much better understood than formerly, and where building is under sanitary supervision, and plumbers are licensed or their work inspected, the evil is fast being remedied. Another and great difficulty arises as to the disposition to be made of the liquid sewage as it flows away from the outfalls of the various main pipes that carry it away from the building and from the streets of the city. The most usual method is to discharge it into some adjacent stream. Thus many a little brook flowing through a village or city becomes the receptacle of a stream of sewage, larger than its own volume, and especially so in the summer months, and in times of drouth when the sewage especially needs dilution. That air and water have much power in decomposing fresh sewage and in removing its disease-producing qualities is well known; but where the limits of this are found by experiment and experience to have been reached, it is very hazardous thus to use these small streams. Where a river is used, very much depends upon the soil and the cultivation of the country through which it runs, upon the density of population along its banks, and upon conditions actually found to exist as to the quality of its water. Chemical, microscopical, biological and botanical investigation afford great aids, while the careful observation and experience of physicians, not only as to specific disease or death, but as to the more general vital condition of the population are of the utmost importance. Where it is not found permissible to introduce sewage directly into a stream, various and often successful devices are resorted to. One, is so to impound and hold the sewage for a few hours as to discharge it in bulk while yet fresh, with the outgoing tide, and so by quantity and the direction and force of flow facilitate its conveyance to more open waters. This will do in some places, as on the English coast, where there is a rise of tide of twenty or more feet, but seldom does where the natural fall is small, and where the rise of tide is inconsiderable. A remarkable experiment in this direction was tried a year or so since to relieve a part of the sewerage of Newark. The delivery of the Sixth Ward sewerage into small creeks on the meadows having become an intolerable nuisance, the idea was conceived of digging two canals out to the bay, one of which should hold the sewage, and the other catch and impound the tide. This was attempted to be done with a fall in the first ditch, so small as was sure to be inoperative whenever a sludge had been precipitated by gravity, and by the salt water acting

on the sewage material. Besides the amount of water this impounded was not sufficient for the purpose. The Secretary of this Board gave reasons before some of the citizens why the plan would fail, and advised if anything of the kind be attempted, that reliance should be had upon a pumping station near the terminus. It was concluded, however, to try the experiment, which, at an expense of about $75,000, has proved a total failure. Another more common method where the adjacent stream cannot be used, is to construct sewer pipes or mains far out into broad, and deep, and rapidly-moving waters. This is often a great relief. Yet, after several years, as in the case of the lower Thames, the deposit becomes a great embarrassment. Another plan is to resort to system of irrigation by which the liquid is sprinkled or poured over properly prepared land, and so is ærated and undergoes chemical charges, and is appropriated by growing crops. Generally such irrigation is so managed as to constitute what is known as intermittent filtration, so that instead of continuoüs flow, plats of land are showered and then have rest. Thus the air and the water-supply to the soil are alternated, and the desired changes go on much more rapidly.

Another plan is to secure this intermittent flow by means of flush tanks and a small-pipe system about a foot under ground, and so irrigate a little below the surface instead of upon it. Methods have repeatedly been introduced to act by gravity and settling basins, by machinery and by chemicals upon the sewage so as to change its character; so as to receive from it its suspended and much of its dissolved matter, and secure what is valuable of it and send the purified water into streams or upon lands. The great difficulty has been that the sludge thus precipitated or separated, has itself had to be dried at large expense and that the material left was bulky and not found valuable enough for land to pay for its separation. Some recent advances as to the compression of this sludge have been made, which much cheapen the cost and gives a condensed manure of value enough to make the reduction of it practicable. This will help to solve the sewage problem for many large towns not on large rivers, and much facilitate the removal of such material. Since our last report the subject of sewage disposal has occupied the attention of many of our cities. Trenton has secured the services of an eminent engineer to furnish a plan for the sewerage of the city. The city of Newark has accepted the plan of several engineers for the disposal of the

sewerage of an important part of the city. The condition of the Passaic river is recognized to be such as to demand some other disposition of the sewage of Passaic City and other towns along its banks. Even with the partial relief which will be thus secured, the use of it as a source of water-supply will probably be ere long discontinued.

HEALTH IN FACTORIES AND WORKSHOPS.

Former reports have not failed to call attention to the very great importance of such State oversight of labor as shall secure for it conditions compatible with the health of operatives or such as shall in extra-hazardous trades or occupations reduce evils to a minimum. Systems of heating and ventilation are now so well understood as to make it possible to secure these so as not to impair the health of indoor operatives. Yet a very large number of factories are greatly defective in this regard. Modes of caring for the dust or particles from most industries are now well understood. The necessity of protection for machinery and of fire-escapes is admitted by all. This State has as yet passed but very few effective laws relating to the subject. Our present Factory act, although of service, has chief reference to the care of minors. Its inspectors do not claim any expert skill in the various details that relate to sanitary arrangements for buildings or the health of those in special industries. For these the English laws provide such medical and sanitary oversight as has greatly mitigated many evils. The English act of 1846 recognized the necessity of surgeons duly appointed, to examine as to the health and physical fitness of those employed among the young, and extended its protection to females. Most of the acts of 1860 dealt with the interests of children and with a regulation of the times and hours of labor. But the act of 1866 provided that every factory to which this act applies, shall be kept in a cleanly state, and shall be ventilated in such manner as to render harmless, so far as is practicable, any gases, dust or other impurities generated in the process of manufacture. Protection to health was a leading feature of this act, extending even to restriction as to the eating of meals in rooms full of dust or of particles from hazardous operations. At this time a close examination among pottery operatives showed how short were the actual working years of most potters, and how many died at an early age.

The English act of 1867 included any premises, "where fifty or

more persons were employed in any manufacturing process." In 1878, a consolidated act was passed of wide scope, including every industry under general jurisdiction, and giving special prominence to the care of the health of all workers as an industrial interest that could not be left either to the judgment of employers or of the municipality. Even in the matter of bake-shops, the reports of a commission showed such evils as to make it necessary to provide that (*a*) "no water-closet, earth-closet, privy or ash-pit, shall be within or communicate directly with the bake-house; (*b*) any cistern for supplying water to the bake-house shall be separate and distinct from any cistern for supplying water to a water-closet, and (*c*) no drain or pipe for carrying off fecal matter or sewage shall have an opening within the bake-house." References to our report of the Health Commission of 1866, and that of 1876, as well as the previous reports, will show how this matter of care of factories, work-shops and workmen has been urged upon public attention. In addition to inquiry in our last report as to the trades and occupations, observation is now being had of several of our important industries, with a view of finding out such defects as injure the health of workmen, and as to the best preventives to be applied. The requirement of the English act of 1878 was that every factory or work-shop shall be kept in a cleanly state and free from effluvia arising from any drain, privy or other nuisance, and shall not be so over-crowded whilst work is carried on therein as to be injurious to the health of workers, and shall be heated and ventilated in such a manner as to render harmless, so far as is practicable, all the gases, vapors, dust, or other impurities generated in the course of the manufacturing process or handicraft carried on therein. The results of such laws, where enforced, have fully vindicated their importance. In one of the dusty industries, that of flax or jute, we have the following testimony: "Fans have been constructed, splash-boards set up, and heat and steam effectually carried off. The masters offered the most willing testimony to these great advantages in promoting the health and comfort of their work people. Another employer asserted two years afterward, that he was at first reluctant to accept the proposed changes, but now he only regrets that his work people had not enjoyed the benefit of these changes sooner." The improvements in woolen and linen industries, in potteries, in metal trades, in printing, and bake-houses, and in numerous other occupations, have been very marked. "It is proved," says Lakeman, "that

the factory act system is capable of universal application, that no sort or condition of employment could not be made amenable to its code, that throughout the Kingdom it revealed that in all trades there were abuses to remove, cruelties to the young to be assuaged, vicious habits to be overcome, parental cupidity to be checked, avarice of many employers to be subdued, civilization, in fact, to be introduced, and order, system and sanitation, the handmaid to health, to be firmly established." While we do not favor any restrictive or arbitrary measures, save such as the welfare of population absolutely require, and while thorough knowledge and prudence are needed by officials under any such acts, we do claim, that as in the schools, so in the factories and work-shops, the State has so much at stake that it cannot afford to leave these at the option of those who may be either careless, or indifferent or uninformed. Both prudence and skill must be at command, so that the inspectors shall point out defects and secure remedies in such a way as will help both employes and employers, and commend itself to all those that are not too greedy, or too unreasonable to be swayed by facts and experience.

TENEMENTS.

A partial inquiry into the modes of rapid and imperfect house construction, and the over-crowding of families in tenement houses, leads us to feel that the time has come when general legislation should recognize, especially in cities, the necessity of some oversight of this matter. The wisdom of the New York laws, which, in this respect, gives large powers to its city Board of Health, has been fully vindicated. Several other cities give like powers. It is a most essential advance of sanitary legislation and has not been found arbitrary, but has been sustained by the court on appeal. We can point to locations in some of our cities which we have personally visited, in which the character of the buildings and the crowded state of their occupancy is not only damaging to the inmates, but a serious menace to the public. In each city, plans of new buildings, or of extended alterations of old ones, should be submitted to the Sanitary Engineers and Health Officers of the Board of Health, and should have the approval of the Board only so far as fairly consistent with the interests of public health. Ill health, idleness and vice are fostered by over-crowding, and restraint upon such construction of buildings as invites and compels it,

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must be recognized as one of the great public interests of the State. Sir Robert Rawlinson, C. E., the eminent Chief Engineering Inspector of the Local Government Board of England, has recently, in three addresses, sought to call more decided attention to the study of the domiciliary provision for the people as an essential condition of social and natural prosperity. Not less important is the subject in our American and State nationalities, in which the forces of the household so soon make themselves felt at the ballot-box and in legislation. In Jersey City and Hoboken, in Newark and Paterson, and in a few other of our cities, we should not await wrong construction, but so regulate, especially as to ventilation, light, and all pipe connections, as to secure the house from becoming a danger to the general public. We are fortunate in being able, in this report, to furnish a paper from one who has had large experience in this direction. The analysis given of the New York law will be found well worthy of study.

EFFLUVIUM NUISANCES.

The attention of the Board has during the last year been called more than ever before to the evils resulting from what are known as effluvium nuisances. That the world should be without occasional unpleasant odors is an impossibility. But that communities should not continuously, or for considerable portions of time, be subjected to odors which are believed to be injurious to health, and which render the life of the ordinary citizen uncomfortable, is a principle of common law no less than the dictate of common sense. No one can look into such a law book as Wood on Nuisances, or read the articles of Counselor Atwater, a member of the Board, or refer to various decisions, both of English and American law, without seeing how clearly this opinion is asserted. If the matter be that of pig-pens or slaughter-houses, it is claimed that the people must have pigs and meat, and that it is inconvenient to have pig-pens and slaughter-houses at a distance. The answer to this is that we may have pigs and meat without nuisance, and that inconvenience is sometimes demanded for health and for comfort. Another answer is that where pens and slaughter-houses are under sanitary inspection, or careful and cleanly care, they can possibly be made tolerable. We have seen an abattoir in the midst of a large city so conducted as not to distress the residents. It is, however, because of the great difficulty of keep-

ing pig-pens, cattle-yards and slaughter-houses in favorable conditions, especially during hot weather, that most cities and villages claim that they should not be within several hundred feet of dwellings. While there is, up to a certain limit, a wonderful accommodation in the human system to organic materials, and such adjustment as to many does not cause any ascertainable injury, yet it cannot be expected that the young, or those in impaired health, or the ordinary citizen will have their senses blunted to bad smells, or their bodies hardened into resistance. It is an ascertained fact that nausea and diarrhœa and an extra demand on vital force are the result in the case of many, and that when some special contagion alights or an epidemic occurs the districts nearest to such odors and those newly brought in contact with them are most likely to suffer.

Our attention needs still more to be turned to the various forms of nuisances arising from useful manufactories. Toward these we have all that predisposition which we should have toward the development of important industries. Yet it is to be remembered that an industry which is of real advantage to a few, and yet renders life more or less intolerable to the many, becoming a general nuisance both by its unpleasantness and its menace to health, is not a real advantage to any community. It deducts from the comforts of the masses and often imperils the health of workmen. In these cases the real points to be determined are: How necessary it is to have the industry in the particular locality it occupies; how far is it really afflictive or injurious, and what means science and art furnish to overcome its evils? All of these, of course, are matters either of opinion, of fact, or of evidence, as to which courts must decide. One great error is that many of the factories fail to avail themselves of the best methods to prevent nuisance. The work itself is done in a slovenly way, or apparatus for consuming smoke or malodorous organic material is not used, or, if used, the stoker or other operative does not properly do the work. Dr. Ballard, in behalf of the Local Government Board of England, and in the interest alike of factories and of the public health, has made an admirable series of reports on various industries. We have seen many establishments so conducted, even in the midst of large populations, as not to be a nuisance or a peril. It is not the business of owners to look to those who complain to furnish the remedy, but it is their business to secure such expert aid and such apparatus as shall reduce to a minimum the evils complained of.

More still needs to be said as to a class of factories or works which directly deal with decayed or putrescible material, and which, under the names of chemical works, refineries, or fertilizing companies, are sure to become nuisances unless in the most skilled hands. The strictness of New York laws as to these, and injunctions and decisions of courts in that State, have led some of these to locate in this State. Often they are just outside of city limits, or in places where the amount of nuisance depends upon the direction of the wind. These are nuisances of which local Boards of Health should take cognizance, and do all in their power, both by inspection and by information to this Board, to either abate or control. Whether the course of procedure of a local Board should be a notice to abate; whether private citizens who are aggrieved should proceed by complaint before grand jury; or whether the case should be carried into the Court of Chancery, are questions generally to be settled under legal advice. Every citizen has, under common law, certain rights of abatement of a nuisance, and to go before the courts with his complaint. But he is too often practically helpless by reason of the effective influence of companies, or of a lack of sufficient money to contend. The State law has, therefore, wisely conferred on the local Boards of Health the same powers which inhere in the citizen, and so made it possible for the Board to become the complainant. Further than this the law cannot go. If the influence of capital and individuals can prevent a public sentiment against such nuisances, or elect Boards of Health who either fear or hesitate to do their duty, the residents of the community must suffer or move into a more correct public sentiment. It must not be complained that the law is inefficient. As a Board we do not think that there is need to lodge summary proceedings with us, although we are always found available for examination, opinion, or advice. Where there are lawyers and courts these are generally more effectual, in co-operation with local Boards, than any attempt to transfer to non-legal bodies what is the legitimate sphere of skilled legislation. The rights of local Boards should be well strengthened before the higher courts, in which there is sure to be due consideration of the rights of the citizen, as well as of those of skilled industries.

As to the petroleum nuisances at Constable's Hook, this Board has had much correspondence with the New York State Board, which has had occasion also for much complaint as to the injury done to Staten Island. The Standard Oil Company has made much effort, by new

machinery and skilled appliances, to diminish the evil. Other factories have done very little. The local Boards and citizens have their chief defense in resort to the courts. The law of last winter, prohibiting the throwing of the sludge into the river, was important, as by it our food fishes were being killed or rendered unpalatable for food, and unpleasant and noxious odors were being disseminated.

The dealing with the petroleum sludge, in order to recover from it the sulphuric acid, and the use of the crude sludge in various establishments for the manufacturing of fertilizers, has also occasioned much nuisance. In these fish, meat, bones, or other decayable or putrescible material add to the evil. The Secretary and others, in behalf of the State Board, have made careful inquiry and personal examination both directly and in aid of the local Boards. In one case a warning statement of the facts was made to the grand jury. We believe that much good has resulted and that this evil can be greatly mitigated, or, if necessary, abated, if local residents and authorities do their duty, or if proprietors will profit by methods now found efficient and within reasonable cost. The bone factories near the Passaic, and the rendering establishment on the meadows near the Hackensack, still furnish to the traveling public, and other long-suffering worthies, their annual tonnage of scented particles, but no local Boards have attempted opposition. From Newark many complaints have reached us as to continuous foul smells and odor factories, but as no individuals have instituted proceedings and as the city Board of Health, if strong in its individuality, is weak before the law, no relief has been sought. In general it can be said that if only localities and local Boards would judiciously and prudently, yet promptly, do all that the laws of the State and the higher courts provide, there would be far less menace to the public health.

OUR SCHOOLS AND HYGIENE.

The importance of considering the physical education of the young more and more presses itself upon the attention of this Board. As it is always difficult to change the habits of those of mature age, the chief progress in any permanent improvement of the condition of a people must come from impressions made or habits practiced during the training period of life. It cannot be concealed that our American population has in the last few decades shown deterioration in physical

vigor. In some cases it results from the overcrowding, incident to close city populations; in others it is owing to a want of active occupation in youth. Before the age of twenty-one there is more of idleness, or less, at least, of systematic labor and instruction in exact methods of work than formerly, and so less of incidental physical exercise. It is admitted that under our common school system there is need of a kind of education which shall more thoroughly fit young men and young women for the manual duties of life. From the ages of seventeen to twenty-one there is many a youth whose time is not profitably employed either in actual work, or in that kind of drill or education which shall fit him for useful labor. Often the young come to this age showing a lack of that vigor which, to those not endowed with wealth, is an indispensable prerequisite to success. Health is so much the capital of all work, that plans for its securement cannot be left out of our systems of education. As our school system comes to be examined, it is found not only that no proper attention is given to the teaching and enforcement of practical hygiene, but that children are subjected to influences such as are sure to unfavorably affect their vigor. It is evident that a system of public instruction in this respect is greatly needed. The advances made in the last twenty-five years, in our knowledge of physical laws, as applied to the human body, and in the study of the natural and artificial adaptations and aids to health, are such that it is feasible so to teach physiology and hygiene in the schools as that children shall come to know and to be trained to practice what is needful for their bodily welfare. They would thus become so acquainted with what is requisite for healthy ground, healthy dwellings, pure air, pure water, good food and proper clothing, as that they would know how productive and enjoyable life can best be maintained. To secure this kind of instruction it is not sufficient that some general advice should be given, or a book on physiology be studied a little, or that now and then a lecture should be given. The teaching and practice of hygiene must be conducted just as distinctly as is the exercise in grammar or penmanship, or in any other of the branches usually taught in our common schools. It should have especial prominence in the Normal School, and in the various cities and State Institutes in which teachers are being prepared for their work. We are glad to know that some of the city boards of education have realized this, and have taken measures for more thorough instruction and discipline of this

kind. The past two or three years have been very productive in text-books for this kind of instruction. If a thorough course could be given to the teachers of the State under skilled medical and sanitary direction it would result in a more thorough introduction of this branch of education into our common schools. This Board has a large collection of text-books in this line, and is glad to co-operate with local authorities in attempts to extend its teaching to all of our common schools.

Several of the States have passed laws requiring this kind of study and examinations in physiology as a prerequisite to certificates for teaching.. It is not enough to boast of our systems of education if they do not aid in the physical and industrial, as well as the intellectual, and moral welfare of the population.

OUR CHARITABLE AND PENAL INSTITUTIONS.

The attention of the State to the condition of its charitable and penal institutions, although not yet what it should be, shows some commendable advance. In 1866, the State Sanitary Commission made some important inquiries into the care of the insane in county and township almshouses, as well as into the general condition of the houses and their inmates.

In the fourth report of the State Board of Health (1880), a valuable collection of facts was given as to almshouses and jails.

The sixth report, 1882, furnishes additional details as to this inquiry. The seventh report, 1883, still further illustrated the importance of a systematic oversight of these institutions in the interests of the State.

The report of the Bureau of Statistics of Labor and Industries (1883) has a very valuable article on jails, asylums and almshouses. We believe no one can read these series of reports without recognizing that both the health and industrial welfare of our citizens require a systematic attention to the condition of such classes of population. While it is hoped that the Council of Charities and Correction will secure a valuable oversight, the Board of Health and the Bureau of Industrial Statistics cannot but realize their necessary collateral interest therein.

The visits and inquiries which have thus far been made have shown the State institutions as having a much better management than most

of those of the counties and townships. While there has been some occasion to examine and advise upon the sanitary arrangements in these, it has been either when our attention was called thereto and advice asked by the managers or when some minor defects have attracted our attention.

The difficulties experienced as to the sewerage in the asylum at Morris Plains, have been under the advisement of the managers and of the State Board of Health, but the Superintendent of the asylum has been chiefly in oversight.

Both the old and the new asylumns at Newark have been visited, and some suggestions made. While we regard our asylum systems, taken as a whole, as seriously defective, and as not the best possible for health, occupation and recovery, it is not in the power or province of this Board to initiate any change of system. Especially in the county asylums is it the case that the lack of system, and of employment, tends more to confirm defects than to improve the patients.

Before the Asylum for the Deaf and Dumb was occupied, a careful examination was made of its sanitary arrangements, which, with very slight exceptions, were found quite in accord with the most approved modern methods.

The excellent executive ability of the Keeper of the State Prison has extended itself into careful inquiry and oversight as to matters of sanitary construction and administration. While the older parts of the prison are difficult to keep in good sanitary condition, chiefly by reasons of imperfect ventilation, the newer parts have many advantages which are well utilized.

The two penitentiaries of Hudson and Essex counties, which contain prisoners of short term sentences, are, in the main, well adapted for their purpose. As a whole, our jail system is defective.

This is all the more serious, since, as now conducted, they have social charms for the class who occupy them. By the present system, those who have been in them not only lose any self-respect they may have had, but find that the most comfortable disposition they can make of themselves is to do some petty crime, or get drunk, or become so vagrant that they secure commitment. They here are not only fed and sheltered, but have congenial company, and are too often educated into real or worse criminality. Our jails are thus made badly-managed almshouses, and do great harm to their inmates. We believe that the increased expense which thus yearly falls upon

our cities and our counties would more than pay for all the structural and administrative changes that would be necessary to break up this educational system for crime.

The sanitary conditions of the jails and of their inmates is not only bad for the jails, but a menace to the localities which they are in. It was their evils as pest-houses that first awakened the attention of the philanthropist, John Howard. The danger to health, and the even greater danger to the good order and peace of society, demands the earnest attention of our Legislature and of all good citizens, to all our charitable and penal institutions. As it has fallen to the lot of the secretary more than to that of any other citizen of the State to visit and study these institutions, he has reason, on behalf of this Board, to speak plainly as to the need of radical changes.

CHOLERA, AND PRECAUTIONS AS TO IT.

It is occasion for great gratitude that the cholera, which has caused such wide-spread desolation in Southern Europe, has not yet found foothold in America. Yet the history of past epidemics; the delayed but steady march of the invader heretofore, gives us a warning not to be unheeded. The transfer from Egypt to Southern France had a year of interval. With the rapidities of commerce and the frequency of inter-communication, it is not probable that the United States will escape invasion another year. If this were possible, the significant words of the distinguished authority in England, Mr. Simon, in 1873, are still of full weight: "It is important for the public very distinctly to remember that pains taken and cost incurred for the purposes of preventing cholera cannot in any event be regarded as wasted. The local conditions which would enable cholera, if imported, to spread its infection in this country, are conditions which, day by day, in the absence of cholera, create and spread other diseases: diseases which, as being never absent from the country, are, in the long run, far more destructive than cholera; and the sanitary improvements which would justify a sense of security against any apprehended importation of cholera would, to their extent, though cholera should never reappear, give ample remunerative results in the prevention of those other diseases. * * * The peril and the wrong of neglect is therefore not to be reduced by any consideration of a possible, although highly improbable, exemption; neither is it

modified by any increased hopefulness as to the successful treatment of the actively developed disease. Doubtless it is, still lamentable, that one should still have to speak almost with despair of the medical treatment of developed cholera; but so it is. The task continues to be, as from our first acquaintance with the disease it has been, an almost hopeless task to the practitioner. * * * Practically, then, more and more as facts like the above become notorious, the business of resisting cholera on any large scale resolves itself into aims of prevention. And in contrast with the powerlessness of curative medicine, the preventive power which we possess is among the happiest possessions of science."

The doctrine of the cholera-fungus was not new at the time of the former epidemic, and the probable discovery of the comma bacillus by Dr. Koch, while fulfilling expectation and very valuable, does not as yet throw any light upon the treatment of the cholera patient. It does, however, confirm former views as to the alvine secretions being the media of the contagium; also by the apparent fact that the bacillus is very short-lived if only it can soon be subjected to thorough dryness, makes more hopeful our success in preventing the spread of the disease.

These words, uttered in 1866, are still emphatically true:

"For public use in this country the all-important principle of cholera prevention is that 'cholera derives all its epidemic destructiveness from filth, and specially from excremental uncleanliness,' and 'the local conditions of safety are, above all these, two: (1) that by appropriate structural works all the excremental produce of the population shall be so promptly and so thoroughly removed that the inhabited place in its air and soil shall be absolutely without fecal impurities; and (2) that the water supply of the population shall be derived from such sources and conveyed in such channels that its contamination by excrement is impossible.'"

The Cholera Commission of the German Empire, which met in 1873 and reported about 1884, after nearly ten years of research and experience by the ablest authorities, united in this summary:

"'Of all the measures which may be applied to the prevention and combating of cholera, those take the first place which have for their aim the improvement of general sanitary conditions. All specific measures against cholera will prove unavailing, unless we pay the strictest attention in inhabited places to the purifying of the soil from

organic and easily putrifying refuse, to the drainage of the soil, to the constant flushing of the sewers, to the frequent emptying of cess-pits, the complete doing away with pervious cess-pits, the careful inspection of dwellings and closing those that are really hurtful, the provision of pure water both for drinking and other domestic purposes, and the like. The commission expresses here the united opinion of all, that the measures demanded by public, general hygiene offer the best protection, not only against cholera, but against all other epidemic diseases.'"

"Prof. Horsley, of the University of London, in his classic and experimental contribution, says: 'Where there is faulty hygiene and impaired vitality, there is consequent easy invasion by vegetable organisms.' Although the animal system is everywhere surrounded by these parasites, 'during health no vegetable organisms are found in the blood.' The particle-like moisture may be in the air, but the person and the place determine the manifestation. This dew of disease as a rule will not be found in the gravel highways of purity, but will drench with its death-sweat the fields and the bodies rich in the food on which it thrives."

How these results are to be best accomplished is the practical question of a wise forethought and foreact. Of how it was not done in the cholera of 1873, in a certain stricken and desolated town in which there was "great overcrowding and bad house construction; bad water-supply; bad drainage; absence of privy accommodation, and accumulation of surface nuisances," the following is the brief record:

"If a prompt assent and excellent resolutions would have cleaned the town, long before my inspection it would have been clean; but unfortunately it had not been deemed necessary to see to the *execution* of the orders given, or even, I fear, to provide the necessary force for carrying them out. There was no inspector of nuisances for this town of nine thousand inhabitants, devoting to that work, as the circumstances of the town urgently required, his whole time; but the inspection has been made to devolve upon an officer having abundance of other duties, and not especially fitted for this; the scavengering force was inadequate, and though there existed, or was believed to exist, a sanitary committee of the town council, it did not appear that they accomplished very much." The two great and embarrassing hindrances to the uniform administration of sanitary measures are either the absence of a properly organized executing force, or, if so organized, a defect in actual constancy and thoroughness of method and of the pecuniary means for its securement. Yet, the proper modes of

organization and execution are and have been in operation in the best sanitary districts, and there is no kind of work done for a city which there is so much true economy in having done well. And as to all threatening expenditures, it is needful to have in vivid remembrance the fact that "measures of cleanliness taken beforehand are of far more importance for the protection of a district against cholera than removal or disinfection of filth after the disease has actually made its appearance." Indeed, there is some limitation as to the removal of stored filth after the disease has located in a part of a city lest the act of removal may increase a danger which ought never have been allowed so to accumulate, and which will, if these words are heeded now, be removed in advance of any invasion of this State during the next summer. And because fall, winter and spring are so much the most seasonable periods for the removal, which in the case of many cities will occupy much time, it should be begun without delay. "The spread of cholera is generally in proportion to the density and want of cleanliness of the population among whom it occurs."

Besides that general effort for cleanliness, of which the details have been before noted in former reports, there are three to which especial attention should be given.

(1) There should be a careful examination into all sources of water-supply, and into any impurities to which potable water is exposed. Where there are serious contaminations, radical structural changes must be made; where there are not, the incidental sources of temporary deterioration must be watched and the remedies be clearly stated and applied.

Reservoirs and pipes may be greatly improved by attention this winter even, where the supply itself comes to them pure and wholesome. Often, where there is a public water-supply it needs to be accurately known how many houses and families depend on cisterns or local wells, and a record needs to be made, so that in any given cases of sickness or death any possible casual relation may be traced. Sometimes where the supply itself is not altogether satisfactory and new supplies cannot easily be secured, large settling and filtering reservoirs or the local filters of cisterns and house-supply are of essential service. • It should also be understood that as a temporary resort, where the water is under suspicion and needing to be used, the boiling and pouring of it from one pitcher to another to aerate it, makes it a safe and a fairly palatable drink. Dr. Farr, in his report to the

Registrar-General of England, on the cholera of 1866, says: "The great explosions of cholera in England have arisen from the use of the water of tidal rivers into which the recent sewage of large populations has been poured."

(2) The next important measure is the prompt and thorough removal of fecal matter and excretions, whether of human beings or of animals, and of every sort of house-refuse or filth, wherever collected in the vicinity of dwellings. And that accumulations may not be going on in unseen places, or that befouled, or leaky, or air-locked or trapless pipes may not be a source of continuous deposit, careful skilled examination should be had by competent inspectors.

(3) As bodily and personal cleanliness and neatness, not only as to all bodily covering, including the skin, but also as to naturally healthful conditions within, have to do with susceptibility to many diseases, it should be known that improper foods and indulgences, bad air, and the special foulness of secretions caused by errors of diet or of life, are invitations to contagion, and that the system should be kept as thoroughly as possible in a natural condition.

In view of the possible invasion of cholera, or other foreign pestilence, there are a few preparations of another kind which need to be considered before its actual approach, since the knowing what to do and the doing of it promptly, as to the source of invasion, as to the person, or as to the house, lot, or vicinity, is often the determining point as to whether the first case or cases shall extend into an epidemic. This precaution, so far as this State is concerned, relates to (*a*) what guards are to be exercised against approach; (*b*) what facilities are to be provided and at hand for any first case or first house concerned; and (*c*) what are the more extended provisions in case of any actual increase of cases. In all this we of course take it for granted that there is now ready and equipped a local Board of Health, and that they have funds at command and will be promptly aided by such of their citizens as they may need to call to their aid.

We think that, in addition, all ports of entry in this State, and all Boards of Health of cities, counties, or townships bordering on the coast, should have similar authority to that given to the Board of Health of Perth Amboy, Chapter XIII., Laws of 1882, or probably, under the general law, may now exercise it. (See Chapter CLV., section 7, Laws of 1880.)

Some legislation should also be had by the State to provide addi-

tional appropriation in case of need. Also, because this State is a great entrance and exit of immense railroad travel and traffic, and because, especially in such epidemics as cholera, yellow fever, etc., cars and the closets and conveniences of railroad stations become chief sources of peril, there should be, on the part of the State or local officers, special charge of these. Such cases as this are on record. In 1873 a colored boy went from Lebanon, Kentucky, where cholera was present, to Columbia. He suffered from diarrhea, and at this latter place used a privy which was overflowed, but to which no sickness had previously been traced. He was found in a state of collapse, and died in a stable near by. The negro man in charge of the stable was attacked and soon died. Farmers who came in from the country, and only visited this privy once, were stricken with cholera. The privy was disinfected, after which no cases were traced to it. At all railroad stations and at all public resorts, the local Boards of Health should require the most perfect cleanliness and disinfection. The investigations of Koch, in the midst of the cholera in Egypt, India and France, seem to fasten the infection so singly to the fluids and excretions coming from the digestive and intestinal tract, that we cannot too thoroughly guard as to these, and as to direct exposure thereto. If the view of Koch is correct, that soiled clothing becomes infectious soon after it becomes soiled, it shows that all discharges should be received into vessels holding a disinfecting solution, or on disinfected cloths. When a patient comes under treatment, it should at once be inquired what privies or water closets have been recently used by him, and a person should be sent to disinfect if the place is within reaching distance. The duties of a municipal Board are so well summarized in a memorandum of the Ontario Board of Health, that we adopt it, with slight changes:

"The local Board of Health should issue and enforce directions for the immediate reporting of all cases or suspected cases of cholera, as of other infectious diseases, in compliance with the public health act of 1882.

"On receipt of such notices, the local health officers should immediately examine into the reports. If the medical attendant reports the case this will be sufficient verification.

"If the person has been taken sick at some public place, and needs removal, a metal ambulance with safety bed should be at command.

"The Board should secure the isolation of those sick with or exposed to the disease.

"Keep record and give notice of infected places, as far as needful.

"Attend more carefully to the relief the poor.

"Regulate as to funerals of persons dead from the disease.

"Cause rooms, clothing and premises to be properly disinfected.

"Give certificates of recovery and of freedom from liability to communicate the disease.

"Every person known to be sick with the disease should be promptly and effectually isolated from the public. No more persons than are necessary should have charge of the patient, and these should be restricted in their intercourse with other persons. The children of the family and other inmates should be prevented from mingling with others in schools or other places until the period of incubation of the disease shall have passed.

"Notices may be placed on the house in which a case of the disease exists, and no unnecessary persons allowed to enter.

"Boards of Health should have distributed in every house copies of the instructions to householders and private individuals as herein contained, or others of a similar nature, and should see that the same are carried out. [See Circulars of this Board.]

"In populous municipalities isolation hospitals should be provided just as soon as intelligence is received of the existence of cholera on this continent. These hospitals, if happily not required for cases of cholera, will be a useful investment for cases of small-pox, scarlet fever, or diphtheria, constantly occurring. In less populous districts they may either be portable, or may be rapidly constructed on the nearer approach of the disease, or if required for other infectious diseases.

"In populous districts reception buildings should also be established for the reception of persons not actually attacked with cholera, but who require to be kept under observation least they should become fresh centres for spreading the disease. Such persons should there be provided with clean clothing, allowed to prosecute some daily avocation, and be kept under observation fourteen days.

"The local Board of Health should provide a public laundry and disinfecting house, otherwise the infected clothing may become a ready means of spreading the disease. Metal vans or carts disinfected or holding disinfecting fluids should be provided for carrying foul clothing. Former circulars give directions as to disinfection. Sulphur cones which can be lighted by a match are convenient for disinfection of vessels, closets, etc., or to set on fire larger quantities of sulphur.

"If it be found that carelessness exists in carrying out the precautions recommended regarding funerals, some officer or officers should be detailed by the local Board of Health to see that they are so carried out.

"It must be borne in mind by local authorities that want of the necessities of life and of medical attendance and medicines favor the spread of the disease and increase mortality, and that such wants are

more apt to occur during a time of epidemic, when bread-winners may be prostrated or waiting upon those who are attacked.

"Local Health Officers should make notes of the source of any case which may occur in their locality, and of all other facts likely to be of service in a statistical point of view, or in the future study of the disease, and its prevention or limitation."

One of the earliest duties of a Board is to pass an ordinance requiring the immediate report by the physician, or other person in attendance, of any case of suspected cholera that may occur.

Each Board of Health should, in advance, have a full plan as to what shall be done with any case of cholera reported, whether as occurring to a person not a resident but passing through the district, or to a resident in some house within their jurisdiction.

The questions that arise are, Shall there be removal? If so, where? How are medical attendance and nurse care to be secured? The question of removal, except in the case of those taken on the highway, or in some public conveyance or station, is a relative one. If the case occurs in a good locality, where the family can command the best of attendance, the duty is to choose, if possible, a high, airy room, to divest it of all unnecessary clothing or furniture, and by means of fire-places or open windows, with wire screens, to secure pure air without draft. The nurses, as well as patient, must be isolated from others as far as possible, lest by garments, etc., they convey the disease. Details as to the management of the sick-room, use of disinfectants, etc., are given elsewhere. But for other cases which are likely to occur in unfavorable localities, there should be no delay in providing isolation hospitals. This Board is prepared promptly to furnish plans for any such hospital.

The desirability of removal to a hospital is always a relative question, but experience has shown that there is less risk in the vacating of an infected spot than in the transfer, if only the transfer is conducted with systematic precaution.

A cholera ambulance, of metal bottom and sides and well disinfected, and its air kept charged with a disinfectant, and with the transfer in skilled hands, is not so likely to cause spread of the disease as the locality itself, which, being cleaned, can be fully and promptly disinfected.

Emergencies arise which sometimes require that a building already infected, and not of the best location, be at once converted into a hos-

pital, the disadvantages being overcome, as far as possible, by scrupulous care and disinfection.

It is of great importance to organize, in an increase of the cases, a medical corps, ready on call, and especially to have at hand efficient nurses, under directions. These can only be had when arranged for in advance. So much depends, not only to the patient concerned, but to entire communities, on the prompt and efficient handling of the first case in any new locality, that this kind of preparation is indispensable. It makes a great difference whether we start to put out a fire an hour after it has begun, when we might have started with the first blaze.

Another matter of great importance is not only that proper directions be given as to management, but that some one in general oversight see to it that they are efficiently carried out. Nothing, for instance, is more common than "dabs of sanitation," or than to "play disinfection." Most of disinfection amounts only to a quieting of the mind. But real and competent disinfection is very successful and of the greatest importance. Methods and the choice of materials are well understood. These are fully given by this Board in Circular VIII., Sixth Report, 1880, Circular XLIV., as to Communicable Diseases, and in the Cholera Circular XLV., and to be had on application to us by postal. To the disinfectants there named, three others may be added: first, corrosive sublimate, in the solution of one ounce to eight gallons of water, is of great value, to be sprinkled about, or to be placed in water-closet utensils, sinks and cesspools, or for soakage of clothing, towels, bedding, or other textile fabrics. As it is a corrosive poison, it must be under the direction of the nurse or physician. Second, commercial sulphuric acid, in the proportion of one pint to eight gallons of water, is very valuable for the same surposes and used in the same way.

As a pleasant and efficious wash to be used around or upon the patient and for personal washing of hands, face, etc., the following solution of crystals of thymol is advantageous:

Two drams of thymol, dissolved in ten drams of alcohol, twenty drams of glycerine and one gallon of hot water, kept in bottles. These are named because they are important additions to our former disinfectants. Our own choice is as follows:

For Washing the Hands and Other Parts of the Body.—Thymol, or

chlorinated soda (Labarrague's solution). If these are not at hand, zinc chloride or lime chloride.

For Utensils Used.—Iron sulphate (copperas) solution, one and a half pounds to gallon, or sulphuric acid, one-half gill to one gallon of water.

To Place Clothing In.—Zinc chloride, one-sixth of a pound to a gallon of boiling water, or, in safe hands, one ounce of corrosive sublimate to eight gallons of hot water.

For Sprinkling or for Washing Furniture, etc.—Solution of corrosive sublimate, as above, or the zinc chloride solution.

For Fumigation of Rooms or Out-Houses.—Burning sulphur (see circulars), or the fumigating cones, mostly of sulphur, and easily lighted by a match, can be used instead.

For Scrubbing Floors.—The warm corrosive sublimate solution, or sulphuric acid, or carbolic acid and water, or the iron sulphate (copperas) solution.

For Disinfecting Privies, Secretions, etc.—The same.

In case of death, roll the body in a sheet saturated and wrung out in a solution of the corrosive sublimate, or copperas, or zinc solution, and await the undertaker, who is presumed to be acquainted with all the methods of rendering the body and the coffin safe for transportation and burial.

Precautions to be taken by Individuals.—During a period of cholera or its threatening, there should be especial caution as to all that relates to a good physical condition.

Undue anxiety or fear undoubtedly seem to make the body more receptive to disease. Precaution can do great good, and fright great harm. If the cholera is in your district, be sure that all water used by you is good; if not, have it boiled or use it as in tea or coffee. As to milk, boil it or know its source of supply, as beside its own possible contamination, the cans may have been rinsed with water which was impure. Alcohol in bad water does not make it pure, and the free use of it or of beer is not favorable to the best health. Such good fruit and vegetables as have been found generally to agree may still be used, but none that are unripe, imperfect or half decayed. Meats should be well cooked, and much care should be taken as to their quality.

Exposure to extremes of heat and cold, and in moist, hot weather, and late hours and loss of sleep, should be avoided. Clothing of

flannel next to the skin is needed. Regular life everyhow is the rule. Directions as to cleanliness of locality have already been given. If you are in an unhealthy house or locality, move from it in time if you can; if not, put it in the best order possible. As cholera is chiefly, perhaps entirely, conveyed by discharges, use no public closet, or if compelled so to do, carry with you some such disinfectant as is recommended for closet use. While physicians and nurses who know what precautions to use and use them are not more liable to the disease than those not in attendance, yet all who are not needed to care for the sick should avoid exposure. Food or water which has been in the room of a cholera patient should be disinfected and thrown away. No one should eat in the room. Persons who need to visit the sick are wise to brush the hair and wash the face and hands with a disinfectant on leaving the room, and they need not to be nervous about the disease. All clothing and utensils in the room are to be looked upon as possibly liable to be soiled and so to be media of communication of disease. Avoid all second-hand articles, clothing, etc. It is believed by many that five drops of aromatic sulphuric acid, in water, taken before and during exposure, and that the presence in the mouth or system of quinine, arsenic, and some other medicines, and their constant moderate use during epidemics, is protective. If diarrhea occurs, at once attend to it as directed in Circular XLV., and until you get a physician use every half hour, if discharges are so frequent, the doses therein named for adults. If unable to purchase medicine, report very promptly to the dispensary. If possible, assume and keep a recumbent posture. The moderate use of mustard-plasters and a bandage of flannel over the bowels, a little medicine ready for any attack of diarrhea, prudence in food and drink, and a quiet spirit, cure many cases of so-called cholerine. So important and effectual is this early attention that in cholera countries intelligent persons generally carry with them some temporary remedy for any bowel disturbance that may threaten. There is no need of panic over single cases. In four late epidemics (1877–8–9–80) in India, there were 154,986 villages attacked. In 58,972 of these there was only one death, and in 20,596 only two deaths. Yet the fact that in these years the total mortality was 1,380,226 shows how fearfully destructive it is when it finds all the requisite conditions, or is not guarded by efficient sanitary police. This of itself shows that some other facts than its accidental arrival determine its virulency. These facts are

generally local filth, personal filth, overcrowding, and the absence of an efficient sanitary administration ready to act forthwith—which means knowing beforehand what to do, and having been provided with means to do it. While certain climactic conditions may still frustrate our efforts in part, yet our only safety is in thus using the means which all are now agreed greatly tend to prevent epidemics or to restrict their extent and virulency. While recognizing our need of looking to a divine Providence for aid, it is chiefly by obedience to natural laws and by seeking guidance in the use of proper means, and by using these means, that pestilences are to be prevented or stayed.

LOCAL BOARD OF TOWNSHIPS.

The importance and usefulness of local Boards of Health is constantly receiving illustration in the correspondence and experience of the State Board. The fact that here and there inefficient Boards are to be found, that even good Boards do not at once or every time succeed with what they attempt, and that local or personal opposition is sometimes aroused, proves nothing more than we find to be true of most salutary laws. Many of our Boards have outlived the times of indifference, and are now looked to as great conservers of that inalienable right which every person has to be protected from avoidable menace or injury to his health, whether resulting from the neglect of the city authorities or from the unsanitary condition of some person or premises.

The powers given to the township Boards of Health are even more complete and satisfactory than those possessed by city Boards, since with the latter there are sometimes collateral or conflicting powers of other Boards, or of the municipal governments, that have to be explained, understood or adjusted. Each township Board, if efficient, can abate nuisances, put in operation laws as to drainage, etc., and secure a complete registry of marriages, births and deaths. Where there is an uninformed public opinion, they can do much to enlighten, and will find this Board ever ready to aid. By the present law they are allowed to spend fifty dollars a year without a direct vote of the township, and the township committee may, in their judgment, vote more, or order the payment of bills exceeding this. It would be well to raise the amount to one hundred dollars, since no Board is so likely to be economical as a local Board of Health. On the other hand, it

is often easy by factious opposition, or an honest ignorance as to the necessity of their action, to curtail their usefulness by leaving them without funds. While we are most conservative in view as to the degree to which the State should direct as to local expenditures of money to be raised by localities, yet, as in many ways the State gives local aid, it also is entitled, for the avoidance of general peril, to require some local sanitary care. It is claimed by some that all members of local Boards should be paid. This is not claimed as to Boards of School Trustees, and it seems to us that it is not unreasonable to expect that some citizens will be found enough interested in this great concern to show their interest by personal and gratuitious attention. This, however, is not to be expected where, as in epidemics or in villages or localities needing special investigation, an inspector or other officer needs to be for a time employed. Many assessors have rendered valuable gratuitious services by inquiries or information. The State permits this Board to aid, to a small amount, local Boards where any special investigation seems to come under the design of the law.

BOARDS OF TOWNS AND CITIES.

Many of the town and city Boards have done effective service. Others are embarrassed by the fact that the municipal authorities consider it their function to enforce a so-called financial economy by restricting the amount to be expended for sanitary purposes within paltry limits. We were sorry recently to notice the great contrast in this respect between our own municipal corporations and those of Great Britain, in which the financial and economic value of Health Board sanitation has been fully tested. A Health Board is there looked upon as so far by courtesy and right supreme in its own particular line, as that its budget of what it regards as necessary outlay is the one rarest of all restricted. Some of our cities still have Boards of Health which, whatever they may be called, are but committees of council to which, in one or two instances, two or three outside members have been added. While charters give power to form Boards of Health and pass ordinances, it seems to be overlooked that in order to enforce ordinances, most of which partake of the nature of police law, there must be statutory enactments and provisions, and exact specifications of methods of enforcement and penalties that have been provided by the State government.

There is also the fatal objection which thought would suggest. Experience has demonstrated that where a Board of Health is thus formed and is necessarily subject to every political change, it cannot have that prudent independence of action needful to the effective sanitary administration of a city. If faithful, it must come in direct opposition to nuisances in which the pecuniary interest of owners is involved. These are generally able, in the end, to rout any faithful sanitary officer directly dependent on political preferment, while the popular ones are those who make a great stir in abating certain kinds of nuisances among those too poor to resist, and do nothing as to others. They seldom *prevent*, and have not that relation to the office which leads to a close study of sanitary art and administration. So signal is the experience in such cities as New York, Brooklyn, Boston, Milwaukee, Detroit and the like, that they have been careful to draw plain lines of separation, not because the chief functions of municipal government should not inhere in the mayor and common council, but because their interest, and a great public interest, requires that the care of public health and the power to deal with the most flagrant causes of disease and the nuisances that are rapidly disease-breeding or death-dealing, should have expert ability, aided by thoughtful citizens who have paid special attention to these matters, and who can execute such laws with a propriety and freedom from embarrassment which cannot be obtained by an ever-changing Board. The law of this State, therefore, has provided for Boards, which, while deriving appointment from the municipal authorities and quite sufficiently under their control, are yet not subject to complete change at every change of administration—only three being allowed to go out at any one time. These have such legislative acts behind them and such conferred standing before the courts as will give effect to ordinances. While we shall not fail to assist as we may even those trammeled Boards which have valuable members and succeed well with those so docile as to yield, or so poor as not to contend, we cannot admit a principle of sanitary government which, in the last fifteen years of sanitary legislation, but one city in America has sought to revivify.

For effective sanitary administration, large powers must be conferred, as in both police and military offices. Men who, because power is given, think that the power must be turned on every time and equally on everything, are never fit for such places, and as soon find their limit as would an engineer who thus dealt with his engine.

On the other hand, any city so conservative on such a matter as the cleanliness and the health of the people that it forms its Board on a system of inherent disability, cannot expect to get along fast in preventing disease and lowering its actual sickness and death-rate. Nor will it, in the long run, flourish in growth and in business. Most of the value of Health Boards depends upon their completeness of organization, their conception of the work intrusted to them, the support of the more intelligent public opinion, the absence of partisan interference, and a proper reliance upon and confidence in the judgment of the Board as to the amount needing to be expended. Their chief duties are summarized in Circular XXXIX. of this Board. No cast-iron rule of procedure can be devised suited to each case. Often the first work is that of instruction. Next, it is to enforce such surface cleanliness as commends itself to good taste, to ordinary neatness, and is for the general interest of every community. It is rarely that a system of spring and fall inspection of premises can be omitted. Suggestions on the part of the inspector are often needed, and, in flagrant cases, the attention of the Board. In a well-cared-for town, the health officer, by reference to his books, or those of his predecessor, is able to tell the underlying soil of each street of the town; the depth of each cellar or basement, and such as are continuously or occasionally very damp or have water in them; the usual water-level in the ground, and the best modes of local drainage where it is needed; the source of the water-supply of each house, and its quality and condition; the position and distance of the water-closets or privies or of any cesspools, and their construction; the places for refuse; the modes and times of removal; the disposition made of garbage; the condition of all house-pipes, or their modes of connection with outside receptacles; the construction of the house as to material, and as to the arrangement of its various pipes and fixtures. He can refer to the record as to the number and causes of death that have occurred in any house for a series of years, or to cases of sickness, with explanatory notes as to them, together with various other items to be taken into account. We outline briefly such a model, not because most will live up to it, but because some communities, especially in Great Britain, have shown how it is possible to keep full account with the health and life interests of citizens on a business basis, and to reap the rewards in prolonged life, in deliverance from sickness, and in that prosperity which is oftenest the outcome of such care.

The one great need of most villages and cities is a really competent health inspector, who, himself, will be able to secure the removal of many evils, and the prevention of many others. Where there is need of complaint, the Board should make it in a formal way, and ask the owner or tenant to abate. If not attended to it is generally better to notify the party that at a certain time and date a magistrate will be asked to issue order for abatement. This is not of the full nature of a trial, since proceedings, which are summary at the start, are allowed, on the ground of impending evil, on the ground that at such a stage, and before the lower courts, questions of this kind are not likely to meet either a speedy or correct solution before a neighborhood jury. The Board, being more responsible than any individual, is answerable in future inquiry if it shall prove to have been unjust, which is so rarely the case.

In other cases, the matter is taken before a grand jury for indictment. In some instances both methods have been followed with effect.

Several Boards have availed themselves of the more summary proceedings provided for under the supplement to an act entitled "An act relating to local Boards of Health," approved March 22d, 1883, especially sections 10, 11 and 12 of the same.

While the conmon law is very wide in its definition of nuisances and claims that even what is constantly so unpleasant to the ordinary citizen as to render life uncomfortable, may be a nuisance without having been shown actually to have caused sickness, yet Boards should be careful not to yield to captious complaints on the one hand, nor to be deterred from action as to pronounced nuisances on the other. It is not because there are no remedies at common law that special acts are passed, but because sometimes its methods are not summary enough, and also because many citizens are too poor or uninformed to be able to secure relief, and have a right to the municipal or other official defense of their health, which it is the prerogative of the State to grant, and which it thus confers upon Boards of Health. Two or three recent decisions in the Court of Chancery are of much importance in further interpreting the health laws of this State. The first, was the case of the Health Board of the city of Trenton, against the proprietor of the American House for sewering into Petty's run.

The case was vigorously contested on both sides, and had long and patient hearing from Vice Chancellor Bird. Besides some efforts to

invalidate the legality of the laws of the State, it was contended that there had been informality in the organization of the Board of Health, and that the former permission of the common council to sewer into Petty's run was of the nature of a contract. Omitting such points as had reference to the special Board, we quote as follows:

"The defendants urge that the manner in which they use this stream to carry away the hotel filth, is not a nuisance, and in no way hazardous to public health. In this respect, as the testimony stands, they are mistaken. The great, the decided preponderance of testimony, is against them. Whatever conclusions may be reached from isolated facts, when these facts are presented in a body they carry the mind at once to the conviction that the defendants are doing violence to their neighbors and fellow-citizens.

"It has been pressed upon my attention that many others are equally, or more, guilty. This I cannot consider. I allowed some testimony on this point, not because I thought it admissible, but that the defendants might be heard above, if I should be in error. I think each one is separately liable for the nuisance to which he contributes. It is no shelter to the one charged that another may have aided directly or remotely, or otherwise.

"Again, counsel insist that this Board of Health has no authority to prosecute; that it has not shown itself to be within the statute. It is urged that, being a special tribunal, created for special purposes, and clothed with definite powers, it must prove that it has walked according to the line prescribed in every particular, and that any departure is fatal to the entire work undertaken. This admits, however, and so the counsel frankly stated, the legal existence of the Board of Health in the city of Trenton.

"But the power or right of this Board to institute proceedings in this court is denied. It is denied that the Board of Health referred to in section 9 of the act of 1883, (Public Laws, 1883, page 122,) in any sense includes the Board of the city of Trenton. That section declares that any such Board of Health, instead of proceeding in a summary way to abate a nuisance, or such source of foulness, may file a bill in the Court of Chancery. It will be observed that it says any *such* Board. If we follow the ordinary rule, we will look for the antecedent of such. This we find in the section immediately preceding (the 9th). That section provides that whenever any Board of Health now organized, or which may be hereafter organized, under the laws of this State, as referred to in section one of this supplement to an act entitled 'An act relating to local Boards of Health,' approved March 22d, 1881, shall be notified that a nuisance or other source of foulness, hazardous to the public health, exists within the territory within which the Board of Health has jurisdiction or control, such Board may examine the matter in a summary way, and order and cause the same to

be abated.' Now when the words 'such Board may examine the matter in a summary way,' are looked at in connection with the words, 'that any such Board of Health, instead of proceeding in a summary way,' &c., in the very next (10th) section, which gives the authority to sue, it will be found, I think, beyond dispute, that the antecedent to the phrase *any such Board*, in the latter section, is found in the one immediately preceding, in which, and in which only, is used the additional phrase, 'summary way.'

"Hence, of course, the inquiry: Does section 9 of the act of 1883 comprehend the Board of Health of the city of Trenton? I think if it does not it has no right to come into this court. Let us attend to the language of that section. It says, whenever any Board of Health *now* organized, or which may be hereafter organized under the laws of this State, as referred to in section one of this supplement, being the act of March 22d, 1881, (Public Laws, 1881, page 160.) It says, as referred to in section one of this supplement, and section one refers to the act of March 11th, 1880, and to a supplement of March 31st, 1882, and also to the act of March 22d, 1881. So that, most evidently, the Boards of Health which may proceed in a summary way, mentioned in the 9th section of the act of 1883, are any and all such as are authorized by either of the acts above named.

"Is the relator such a Board? Again let us attend to the language of the law. The first section of the act of 1880 (Public Laws 206) reads: 'That any city or borough, or incorporated town, or any town governed by a commission, shall have a Board of Health of not less than five, or more than seven members, of which the keeper or recorder of vital statistics, and also one city physician and city health inspector, shall be members, if there be such officer or officers; and the said Board of Health shall be nominated by the mayor and approved by the common council, or other governing body of the city, borough or town, to serve for not less than three years, but not more than three of the number shall go out of office at any one time.' This section declares that every city shall have a Board of Health. But it is said that such Board does not come within the purview of the section last recited. The claim is that this Board is the creature of the common council of the city, and that it has not and cannot have any other paternity. It is said that the council solemnly and formally organized and established it. It is true that July 11th, 1882, the council did, in the name of the inhabitants of the city of Trenton, ordain that there should be a Board of Health established in the city of Trenton, and that the same should be organized in accordance with the provisions of an act entitled 'An act concerning the protection of the public health, and the record of vital facts and statistics relating thereto,' approved March 11th, 1880, and the supplements thereto. From this it would appear that the council only intended to bring the case within the act referred to and its supplements. This ordinance required the mayor to nominate men as members of the Board of

Health, and to send such nominations to the council for its approval. The first section of the act of 1880 requires the mayor to nominate members of such Board and the council to approve of such nominations. The mayor made such nominations and the common council approved of them. All this purports, on its face, to have been done by virtue of the authority conferred by the act last cited.

"In my judgment the law was substantially complied with. The statute says that said Board of Health shall be nominated by the mayor and approved by the common council. It did not require any ordinance. No preliminary steps are demanded by the statute. The first movement contemplated is the nominations by the mayor; and the second, the approval by the common council, both of which were taken effectually in this instance. Nothing else that was done could add to or detract from, either the nominations or approval.

"But, now, the nominations being made and the approval given, it is urged that the prescribed statutory line has been departed from, in the nominations of the health inspector and the physician. The statute declares that one of the city physicians and the city health inspector shall be nominated as members of the Board. Therefore the mayor had no choice. To this extent the legislature made the selection. It is said one of the members must be one of the city physicians and one the health inspector. And this brings us to what is regarded as the fatally weak spot in this branch of the complainant's case, that is, that although the health inspector and one of the city physicians were appointed, their appointment was a nullity, in this case, *because the period of time for which each of them held such office, or could hold such office under the city charter, was only one year, while the first section of the act directing the appointment expressly says that said Board shall be nominated 'to serve for not less than three years.'* Shall a beneficent public work, set on foot by the representatives of the people, fail in its mission because of this seeming irregularity? I feel myself bound to construe the act favorably to the relator. The public are deeply interested; this is made most conspicuous by the title of the act and every line which follows. I must regard the object to be attained or had in view by the legislature, viz., the preservation of the public health. (Sedg. on Stat. Construc. 193). In matters between individuals arising under the statute of frauds, it has been repeatedly adjudged that the act should receive a liberal construction. 'It should be so construed as most effectually to meet the beneficial end in view and to prevent a failure of the remedy.' Potter's Dwarris Statutes 73 and 231, approved by our Court of Errors in Randolph *v.* Larned, 12 C. E. G. 560.

"And there are, I think, some authorities which bring the view as to liberal construction, where third persons or the public are concerned, still nearer in relation to this case. I refer to Perth Amboy *v.* Smith, 4 Harr. 52, 56 and 57. In that case an overseer of the poor had neglected to take the oath of office, but acted as such officer. The

court held that he was overseer *de facto*. Hornblower, C. J., declared that such was the law. 'In those cases where the public good imperatively requires an act to be done without delay, and where individuals have rights *ex debito justitiae* against the public or other individuals which would fail for want of a public functionary to act in the premises.' Hoagland *v.* Culvert, Spencer 387; State *v.* Perkins, 4 Zab. In this case the members of the common council, who had not been legally sworn as such, imposed a tax, the collection of which was resisted on that ground; but the court said: 'That the acts of officers *de facto*, in which other parties or the public have an interest, are valid.' State *v.* Tolan, 4 Vr. 195, 201; The People *v.* White, 25 Wend. 525. 'A clerk of the court, appointed by a judge *de facto*, is well appointed, and may hold his office though the judge be ousted.' People *v.* Staton, 73 N. C. 546; see, further, Savage, Receiver *v.* Ball, 2 C. E. G. 145; Angel & Ames on Corp., Sec. 287, and Bac. Abr., Title Officers, Vol. 7, 283.

"Believing that the object of the Legislature was to achieve some public good, and it being undisputed that officers named were nominated and approved, and that they have acted as members of the board of health, with the numerous cases above cited and referred to before me, there seems to be nothing left for me to do but to regard the objection to the relator's right to sue, because the city physician and health inspector had not, under the city charter, terms of office of three years' duration as untenable. If this objection were to prevail, it would only be by chance that any city could claim the advantages of the act. Every city must not only have the power to appoint such officers for three years, but they must actually make the appointment contemporaneous with the appointment of the board of health, for the loss of a day or a week would as effectually bar as two years. If time be the important principle, its extent or duration must be wholly immaterial.

"I conclude, therefore, the relator is such a body as is contemplated in the ninth and tenth sections of the Act of 1883.

"The counsel of defendants think the proceedings should fail, because the Act of 1881 is unconstitutional. In my opinion the arguments adduced do not reach this case.

"I think the relator was justified in filing the bill. I think the discharging of water-closets, and the like, of the defendants' into Petty's Run, through the pipe named and described in the bill, is a nuisance and hazardous to the public health, and should be abated. I will so advise. The defendants ought to pay costs."

In two other cases—one on behalf of the Board of Health of Lambertville, and the other in behalf of the Board of Health of Bridgeton—parties have been in like manner restrained from the pollution of streams so small as to cause a public nuisance, and in one of the cases affecting the water-supply.

It is evident from cases that have occurred in other courts, that where the facts of nuisance are clearly made out, and there have been no vital errors as to mode of procedure, the series of State health laws is fully sustained.

CEMETERIES.

In the last report of this Board, an able and careful paper on "Interments" presented the reasons why the custom of interments within city limits should cease, and why, also, in townships and near villages, the habit of allowing companies to locate cemeteries without any regard to the approval of Health Boards could be no longer tolerated. Various facts as to graveyards and cemeteries in different parts of the State make it certain that water is often polluted from such causes, and that the air is fouled by exhalations from overcrowded burial grounds. Often spots are chosen without any reference to the relations of dwellings and without proper regard to soil or underdrainage. Since the paper was written, the developments made by the township committee of North Bergen township, in Hudson county, have given great emphasis thereto. They have shown that the five cemeteries of the township have polluted both the air and the water; and that the irresponsible manner of conducting burials, as well as the localities of these cemeteries, has made them a menace to the health of adjacent cities and to the immediate township concerned. Burial has become a commercial industry, so that commercial travelers solicit patronage and secure profits that are large. Success is based upon having the cemeteries of very easy access to cities, and upon the placing of many coffins in the same grave or in the same small plot. On the Weehawken side and Palisade, of the joint cemetery, twenty-eight graves were examined. In five, the top of the box was from eleven to twenty-two inches below the surface; eleven from twenty-five to thirty-eight inches, and nearly all the others less than four feet. Hoboken Cemetery, in about twenty-two graves examined, had seven less than three feet, and the most of the rest less than four feet. In the pauper part "they bury four bodies in one grave." Grove Cemetery, in seventeen examinations, had none as deep as five feet, and most less and four feet. In the burying ground on Snake Hill, in about thirty-two measurements, the depth from the surface of the ground to the top of the box was three and a half inches or less in four cases; from four to eleven inches in ten cases; from twelve to

twenty inches in eleven cases, and but one in the whole number more than twenty-six inches. Much of this probably arises from the plan of putting more than one body in a grave. While these are no doubt not specimens of what universally prevails in cemeteries, it is true that there is need of some more accurate legislation as to cemeteries and burial grounds, so that they shall not endanger the public health.

DISEASES OF ANIMALS.

Each year the study and care of the diseases of animals has increasing importance both because of the immense amount of capital invested therein, and because of the relation they have to the health of the people. Indeed, the light which their comparative study has thrown upon many diseases special to mankind makes some knowledge of them almost indispensable to studies of the causes of human diseases.

Several animal diseases are common also to men, some are intertransmissable. Scarlet fever is now claimed to have been recognized in the horse, and students of minute animal and floral life are very closely studying the natural history of other communicable diseases as related to various species. The whole subject has received a new impetus from the apparent discoveries as to the relation between human and bovine tuberculosis. While we must still await the accumulation of facts and their closer analysis, it is significant that so many careful observers believe in the identity of the two diseases, and also that consumption or other forms of tubercle found in children or older persons is often due either to the milk or meat of tuberculous animals.

We have had occasion the past year to deal with a very valuable herd in this State, in which some of the cattle were affected and had to be slaughtered. The Board was able to settle an important dispute as to diagnosis, and to remove the suspicion of a still more formidable disease. Tubercle, as found in animals, does not so generally affect the lungs as in man. It is more apt to show itself at parts of the peritoneum below the diaphragm and in the mesenteric glands. Sometimes cakes and pearl-like bunches of abnormal growth or deposit are attached at various points on the interior abdominal walls, or to the liver or other organs. The udder is occasionally, but not very frequently, involved. We have seen the carcass of a large, fat cow

so filled throughout its lining membranes with this deposit and the meat so dark and mottled as to show utter unfitness for use. Such meat is always condemned at once in the English market. Where any such has come to our knowledge we have advised that the meat be buried, but no law of the State gives authority as to it. There is some difference of opinion as to whether the milk from tuberculous cows will convey disease. While all admit that it is of poorer quality, yet most do not believe that it will directly impart the tubercular condition, unless the udder or milk gland is itself affected. This a careful examination will usually reveal. As to whether a tuberculous cow will impart the disease to another, there has also been some question. The opinion is fast gaining ground that one tuberculous animal in a herd is likely to infect others. The progress is slow, and those nearest are most liable to attack. Cases reported by the veterinarian of the Bureau of Animal Industry, at Washington, as well as those known to us, seem to give strong probability to what is now a much more common belief than formerly. Tuberculosis is greatly on the increase in Great Britain, and to some extent in this country, especially among Jersey cattle or other select high-bred stock. This affords another evidence of how important it is to have all such diseases under careful observation.

During the past year we have had some opportunity of seeing cases, and specimens of foot and mouth disease, which, happily, has not yet a foothold in this country. But its frequent occurrence in Great Britain, and the great loss it has occasioned, cannot make us too watchful.

Contagious pleuro-pneumonia has required the most watchful attention on the part of the Board. Several outbreaks have occurred, the details of which are to be found in the report of the State Board of Agriculture. We have had continued evidence of the good results of inoculation in those herds where immediate slaughter of the sick has not stayed the disease. But the wisdom of the law, which requires that it be only done by the permission of the State authorities, has been illustrated by important cases which have occurred in unskillful hands, or to those not having knowledge of the law. We still hope, and expect to hold the malady in check, but shall never fully eradicate it so long as border States have ineffectual laws, or the general government fails to protect us from its incursion. Some recent examinations by the U. S. authorities in this State have aided us in our work.

Pneumo-enteritis, or the disease known as hog cholera, has caused

heavy losses in Gloucester, Burlington, Mercer, Union, Warren and other counties. While no new facts have been developed as to the treatment, it is yet true that farmers who have clean pens, and who, at the very earliest moment of an outbreak, or when it appears in their neighborhood, at once remove the stock from the old pens, and furnish new pails, hog troughs, etc., meet with less loss. Small doses of sulphur, of carbolic acid, or of the bisulphite of soda may be of some service to animals not yet sick. For those sick, immediate slaughter, and four feet burial are the remedies; valuable because thus there is a better prospect for the rest of the herd.

Texas cattle fever, and the disease of calves known as Husk, or Hoose, has also required some of our attention.

The duties of the Board, growing out of the new law as to glanders, made it incumbent upon us to deal with promptness with the outbreak in the South Orange car stables, as also with an isolated outbreak in Hunterdon county. At one time various embarrassments were interposed to the enforcement of the law. It was not until the 20th of August that we were able to remove the quarantine near Newark. While in so insidious a disease it is difficult to insure immunity, yet it was gratifying to secure the result attained. A defect in the law made it necessary to charge most of the expense to the general appropriation for the contagious diseases of animals.

The duties of the Board, in oversight of the contagious diseases of animals, have taken a wider range this year than before, and shown the law, as in its main features, facile and effective. While admitting of some minor improvements, it is now the best law of the kind on the statute books of any of the States. In duties arising out of the law, and also in those bearing on the public health, we have too frequent occasion to notice the number of stables, cattle-sheds and pens left in a filthy condition, the dirty surroundings amid which milk is gathered, the careless handling of utensils, the unfitness of many places where the animals are slaughtered, and, in general, a laxity of care as to cleanliness, and as to the meat and milk-supply, entirely inconsistent with the best welfare of the people. The use of malted grains and the high demands for milk produce, have induced many dairymen to locate within city limits. It is essential that all our cities adopt a plan of registering all animals kept in city limits, and that they require an inspection of stables. There is great need, too, that more public abattoirs be established. Only thus can there be riddance from the

many slaughter-house and pen nuisances, and a system of inspection of meats, such as is essential to a good meat-supply. Different grades of meat must, of course, be allowed, but when the veterinarians find lame and sick animals being killed in private shambles, diseased livers and lungs being hidden away lest they should betray the condition of the animal, and uterine calves being removed and dressed for tender veal, it is high time that our cities should take action as to the matter. We do not refer to these as very common, but we do find evidence that, especially in large cities, a great deal of meat unfit for food is on sale. Dr. Farr alleges that boils, attributed to other causes, often result from such food, as well as some skin diseases. There are many degenerations of blood and tissue not specific, or causing specific diseases, but, nevertheless, taxing the vital forces of the system in its necessary effort at riddance, and so depressing the system or endangering the general health. The attention of some of the most eminent physicians of England has been turned to this subject, and it may well engage the attention of physicians here, as well as of veterinarians and the public at large. The whole method of the care of animals, of dairies, and of meat-supply, is one requiring attention and regulation, especially in our cities and in markets.

VARIOUS LAWS UNDER OVERSIGHT OF THE BOARD.

The public health is so inwrought with the welfare of the people that it is not surprising to find provisions in very many general laws which have a bearing thereupon. In addition to these, there are others which are more special in their character, or which have directly to do with the office and functions of local Boards of Health.

In the sixth report, 1882, page 255–260, is to be found a list of health laws to that date, and, in addition, the seventh report, 1883, page 31, adds those more recently passed.

The laws to which most frequent reference is needed by Health Boards, are as follows:

Chapter	LXXI.,	page	117,	Laws of	1879,	as to vital statistics.	
"	CLV.,	"	206,	"	1880,	as to local	Boards, etc.
"	CXXV.,	"	160,	"	1881,	"	"
"	CLV.,	"	217,	"	1882,	"	"
"	CV.,	"	117,	"	1883,	"	"
"	CLX.,	"	237,	"	1884,	"	"

It not infrequently occurs that local Boards fastening their attention too exclusively upon one law or one section thereof, are misled as to the terms of the law. It is always wise in framing ordinances, or in taking any important action involving legal questions, either to ask the judgment of this Board, or to secure the best legal advice. As we often have occasion to obtain the opinions of competent authorities, we are thus sometimes able to aid local Boards in a proper interpretation of the law. It can scarcely ever be said of any series of laws that they are complete, and no doubt there will be found reasons for seeking to improve some of those already passed. But it is our experience that such Boards as have been guided by able legal advice, and been most active in the enforcement of the law, are the ones best satisfied with present legislation. Wise administration is more needed than active legislation. It is often claimed that Health Boards, especially in cities, should have greater attributions of power, and not be so dependent upon the municipal authorities. But it is to be remembered that the local jurisdiction of a municipality is always to be recognized. While there are most cogent reasons why a Health Board should not be a mere changing or ephemeral committee of council, and should have assigned to it special duties not to be enterfered with by other governing bodies, yet it is also true that it should be ultimately responsible both to the council and to the people of the locality.

The only exception to this is, that in certain possible emergencies the interests of the State may be so far jeopardized by the delay of the locality, or by some local and political or personal complications as that it may reserve to itself the right, through its State Board or other State authority, to interfere, and cause to be done that which it may claim to be urgently necessary. In general, the principle of local health government is correct, and if the vicinage suffers by its own failures, it must bear the consequences. But there are more flagrant cases in which, no doubt, it is wise for the State to assert its own rights of local jurisdiction. As a rule these are best asserted in the higher courts.

The law passed last year as to local Boards in cities, extends their jurisdiction over certain evils and gives them powers which, while to be exercised with discretion, are manifestly important for the public welfare.

The law requiring the returns of marriages, births and deaths is

showing more and more its value as a means by which the State keeps an account of its vital increase, but is not as yet used in cities for information as to public health as it should be. The local registry which is now most important is that which will enable the keeper of vital statistics, in any decennial or semi-decennial statement, to tell precisely in what dwellings death has occurred, and the cause thereof, with age, etc. Thus not only is the registry of value in its legal and informatory aspects, but as directly pointing out disease localities or districts. For, however misleading such statistics might be for a single year, it is found that when there are enough data and over enough space of time, they are the unerring signals of sanitary defects, and point to many cases of avoidable death. And when it is remembered that each case of death on an average represents many other cases of sickness, it is seen how significant such data are as to the thrift and healthfulness of the population.

The law as to medical registry is valuable as furnishing an index of those who claim to have received a license to practice from some reputable institution, or to have been practicing at least twenty years in one locality. It is the mildest form of saying that those who offer their services as skilled in dealing with human life amid its greatest perils, should be able to show that they have been adjudged worthy of such confidence. Yet it is to be admitted that so long as no prosecutor of the pleas or other person is charged with the duty of inquiring into the validity of the copies of documents furnished, there is much opportunity for strategy. While the law does not and ought not to discriminate in favor of any one class, it ought some how to assure more fully that fraud shall not be perpetrated. The assuming of a title has been found an easy way of imposing upon the credulity of the people. While there are some evils which records and warning help to expose but which law cannot fully remedy, it is questionable whether some county officer should not be charged with the duty of examining into the genuineness of credentials.

A very gratifying result has followed the enactment of the law as to the sale of kerosene for inside lighting. Producers and dealers have found it to their interests to conform to this law, so that accidents seem to be far less common than formerly. We have not been able the last year to record a single case of injury in the State from the explosion of low grade oil. There will always be occasional cases in which spilled lamps or great carelessness result in burns, but there is no longer reason why any actual explosion should occur.

The law as to the adulteration of foods and drugs has received a proper share of attention. Herewith will be found a report from the committee having this in special charge. The object is to draw attention to the chief and most harmful adulterations, and to watch any new attempts at falsification. In some of our largest cities the duties of a local analyst might well be associated with other duties of a Board of Health.

The facts as to the operations under the milk law during the past year will be found in the report of the Milk Inspector. A change made last year weakens its force. Some legislation ought, at least, to give to city Boards of Health the right of rejecting imperfect milk, and of summary proceeding against milkmen who are found vending it.

The law as to diseases of animals has worked well, and has done much to protect the State. The special law as to glanders was also found effective.

There are some minor and verbal defects in some of the laws relating to public health and vital statistics, but, as a whole, it can be said of them that they are found as facile in application as most of the laws on the statute books.

WHAT LEGISLATION IS DESIRABLE FOR THE IMPROVEMENT OF TENEMENT HOUSES.

BY E. H. JANES, M. D., ASSISTANT SANITARY SUPERINTENDENT OF THE HEALTH DEPARTMENT OF THE CITY OF NEW YORK.

The sanitary condition of the houses of the poor is a subject to which public attention has so frequently been called that it is now hardly possible to deal with it without going over well-trodden ground.

From the fact that the moral, social and intellectual status of men and women will bear a certain relation to their sanitary condition, it follows that the practice of housing a large number of families under one roof, all having a common entrance and a common hall-way, where persons of different grades of intelligence, of moral culture and aspirations, are daily brought together, has a natural tendency to equalize the general condition, as it regards social and moral instincts. The more powerful influences will draw upon the weaker; neat and attractive surroundings will stimulate to worthy aspirations, while the opposite condition is almost certain to discourage noble effort, and to reduce, in some degree at least, the social and moral grade of persons who are daily subjected to such influences. Men and women who have, through misfortune, been deprived of the original conditions and associations under which they were born and reared, and compelled to associate with persons of a much lower grade of moral and social standing, struggle as they will against it, sooner or later find themselves nearing the level of those with whom they are in daily intercourse. Energy becomes stunted, or even paralyzed, moral sense to a degree blunted, and the mind gradually sinks to a condition of disappointment, followed by discouragement and misanthropy. Hence the importance of rendering the dwellings of the poor as comfortable and attractive as possible, that the sacredness of home may be to them, not

a simple myth, living only in fable or song, but a grand reality, encouraging the laborer in his efforts, and adding contentment and happiness to the fruits of his industry.

Although the object of this paper is not to portray in detail the evils connected with tenement-house life, a few general remarks on the subject, before suggesting a remedy, may not be out of place. The apartments allotted to each family in a typical tenement house, such as is usually occupied by the daily laborer, consist, usually, of one main room, and one, and sometimes two, small bed rooms. The main, or living room, used as a parlor, sitting room, kitchen and laundry, is ventilated by two windows, opening to the external air, and a door leading to the hall. There is also a fire-place, which is generally closed, a stove being pressed into the service for warming and cooking purposes. Adjoining this main room we find one or two small bed rooms, as the case may be, located in the central portion of the house, and, consequently, having no direct communication with the external air. These rooms vary in size, the average floor area being about eight by ten feet, each room containing a bed, one or two trunks, perhaps a bureau, while, suspended on the wall, is the extra clothing of the family. It is not easy to overestimate the evils of such an arrangement of sleeping rooms, where nearly one-third of the entire lifetime is spent. The importance of the admission of sunlight to every sleeping room during some portion of each day, is universally recognized and so well understood as to require no more than a brief mention on this occasion. The same may be said concerning the importance of direct ventilation. Human exhalations of organic matter assert their presence by their peculiar odor long after the gaseous products of respiration have disappeared in obedience to the well known law of diffusion. They adhere to the plastered walls of the room, to the bedding, clothing and furniture, and require an extended exposure to fresh air and sunlight to effect their entire oxidation. This cannot be had in the dark, pent-up bed rooms of the typical tenement house; and as each floor of such a house is occupied by two or four families, this evil is always present in proportion to the number of occupants.

Damp and filthy cellars, with an atmosphere poisoned by exhalations from accumulations of refuse and from imperfect foundations, the small yard in which is located the neglected privy, reeking odors from which are first to salute the visitor as he sets foot upon the

premises, are also among the features which call loudly for reform, to which may be added the massing a large number of tenements upon a small space of ground. As an example of the latter, it is not unusual to see a row of tenements fronting upon a street, and twenty or twenty-five feet in rear of these another row built upon the rear portion of the respective lots fronting upon the yards. In rear of these rear houses, at a distance varying from a few inches to two feet, stand the corresponding rear houses of the next street, and twenty or twenty-five feet in front of these last mentioned, stand the corresponding front houses. By this arrangement twenty houses, each twenty feet wide, and as high as it pleases the owner to rear them, may stand upon a space of about twenty thousand square feet of ground. Allowing eight families to each of the front houses, and four to each of the rear houses, we have for each family a ground space of only one hundred and sixty-six feet; and yet, even this will compare favorably with some of the crowded tenement-house districts of our large cities.

As long as such massing of dwellings is allowed with no legal restriction, we shall also have the like massing of human beings. The evils resulting from this excessive crowding, especially to the young of both sexes, who are thus early exposed to associations of the vilest nature; the strong inducement on the part of the older ones to seek at the dram shop and gambling house amusements which their own homes deny them, and thus prepare the way to vice and crime; the exposure to disease and death as a just retribution for this gross violation of sanitary laws, have been repeatedly and powerfully set forth from the pulpit, the platform and by the public press, and it now remains for us to prescribe such remedies as are needed and available for improving the homes of tenement populations. To this end we must secure such legislation as will place the whole tenement-house system under proper supervision. Houses at present standing should be placed in as good sanitary condition as their location and construction will allow. Those to be erected should be in accordance with strict regulations in regard to location and construction, and the number of occupants should be so restricted that each one may enjoy an adequate amount of air space, and in all other respects be favored with the ordinary comforts of domestic life.

The earliest attempt at tenement-house legislation of which the writer has had any practical knowledge, was the passage, in 1867, by

the Legislature of New York, of a bill entitled "An act for the regulation of tenement and lodging houses in the cities of New York and Brooklyn." When, in 1866, the Metropolitan Board of Health was organized, the condition of tenement houses in those two cities was such as to demand early attention from the newly-constituted authorities. The Board and its officers, during a considerable portion of the first season of their official existence, were busily engaged in dealing with cholera, which at that time invaded the two cities. How that disease was controlled is a matter of history familiar to all who take an interest in the success of sanitary effort in this country. This emergency having been met and disposed of, the attention of the Board was then directed to the condition of tenement houses with the intention of correcting as far as possible their existing evils, and preventing their recurrence. It was soon found that some special legislation was required to enable the Board to accomplish the work it had undertaken, and recourse was accordingly had to the Legislature of the State, which resulted in the passage of the above-mentioned act, the principal requirements of which were: First, that each and every room occupied as a sleeping room, and having no direct communication with the external air, should have a ventilating or transom window over the door leading into the adjoining room, and another window opening into the hall, the area of each to be three square feet. This latter window, although it was not strictly consistent with the privacy of a bed room, appeared to be the only means by which a thorough ventilation could be effected, and as the same section required a ventilator in the roof at the top of the hall, when both windows were open there was a considerable current established through the room, which, though far from meeting the necessities of the case, was a marked improvement on the stagnant condition of the bed-room atmosphere which obtained previous to these alterations. The next two sections provided for adequate fire escapes, for keeping the roof and stairways in repair, and conducting away the storm water so as not to injure the walls of house. The next section provided for sewerage, the disposal of excreta, etc., the construction of water-closets, privies and cesspools, in accordance with plans approved by the Board of Health. Sections 6 and 7 provided regulations under which cellars and basements could be occupied as dwellings. Section 8, for the disposal of ashes and garbage. Section 9, for the general cleanliness of the premises, including cellars, yards, privies, cesspools and drains; it required walls and

ceilings of the halls to be whitewashed at least twice a year, and the name of the owner or agent to be posted in a conspicuous place in the hall. Sections 10 and 11 provided for the inspection of tenements by officers of the Board of Health, and prescribed the conditions upon which such house could be vacated as unfit for human habitation.

Thus far the law applied to houses already existing; but the remaining sections were enacted to regulate those to be subsequently erected, and other buildings to be converted into tenement or lodging houses. The provisions were for restricting the massing of tenements by prescribing the distance to intervene between front and rear houses, and an open space in the rear of each rear house, size of rooms, height of ceilings and windows, construction of cellars, water-supply, etc. The act concluded by imposing penalties for violation, being a fine of from ten to one hundred dollars, or imprisonment for a term of not more than ten days, and an additional fine of ten dollars a day as long as the violation continued. And finally, a tenement house was defined to be a house in which more than three families lived, all having the same common entrance, hall and stairway, but doing their cooking and washing separately. These provisions, though not fully up to our present ideas of sanitary improvement, were at the time regarded by sanitarians and philanthropists as a long step in the right direction, and by tenement-house owners as high-handed and oppressive, since it meant a death knell to the continuance of their enormous gains. To the Metropolitan Board of Health, whose jurisdiction extended over the cities of New York and Brooklyn and portions of the adjoining counties, was given the duty of enforcing the provisions of this law; and it was decided to commence with the poorer class of tenements and deal with the most objectionable features so far as the construction, location and surroundings of each building would allow of the necessary alterations. The early attempts to enforce the provisions of this act met, as was expected, with a good deal of opposition on the part of landlords and agents, and it was not until these were made through the courts to feel that the Board was in earnest, that they began to yield gracefully to the requirements of the law. After considerable experience in dealing with some of the worst class of buildings, it was decided to exercise a greater degree of stringency, and to extend the work to all houses that came within the legal meaning of a tenement house, however slight the violation. As an instance of the rate at which this work was prosecuted, I might state that during the year

1869, there were in New York 39,270 bed-room windows and 1,922 hall ventilators inserted, and a corresponding number of other violations corrected. The result of this was to improve very materially the condition of New York tenements, and yet as the public became more interested and better educated in sanitary matters, further improvements were loudly demanded; and in response to a great public uprising in behalf of the tenement population, additional legislation in the form of amendments to the law was obtained in 1879.

The main provisions of these amendments were: Regulation of distance between front and rear houses, forbidding the placing of any tenement nearer than ten feet from the rear line of the lot, limiting the portion of ground to be covered by any such building to sixty-five per cent. of the area of the lot, and requiring that each sleeping room shall have at least one window of not less than twelve square feet area, admitting light and air from the street, yard, or as otherwise provided in a manner, and on a plan approved by the Board of Health. By this act the owner of a tenement house containing more than ten families is required to have a janitor or housekeeper, who shall reside on the premises, and have general charge of the same. The act further provides for the appropriation of a special fund to enable the Board of Health to continue tenement-house inspections, and enforce compliance with the law.

This later legislation applies principally to houses about to be constructed, and I will add that its measures have been strictly enforced, some discretion being allowed the Board of Health where circumstances admit of its being exercised. Corner lots are exempt from the sixty-five per cent. clause, but even in these cases the rear space of ten feet is retained.

From what I have seen of the working of this law, I am convinced that any reasonable system of legislation will result in the improvement of tenement houses, and a consequent elevation of their occupants. Under the law we have been considering, every plan of a tenement or lodging house is submitted to the Board of Health for that body's examination and approval. Not only are the means of affording light and ventilation, as shown on the several plans, carefully considered, but, pursuant to the law regulating the plumbing business, it is required that every such plan shall be presented for approval, and a copy of the plan, as approved, be filed among the

records of the Health Department. By this provision the department is enabled to refer at any time for information relating to the construction and plumbing of every tenement house built since the law took effect. Not only has this law secured to new houses some very desirable improvements that cannot be applied to the old, but the latter were made materially better by its workings, and, as these, year by year, are gradually disappearing and a better class of houses taking their places, a complete renovation of the whole tenement-house system may now be regarded as a matter of time. Legislation, to be effective, should be so framed as to enable us to take full advantage of the plan of the ground upon which tenements are to be erected. A full building lot in New York City measures 25 by 100 feet, and the law is so framed as to apply to such a lot. Doubtless a better result as to light and ventilation could be secured, were we able to take a portion from the length of each lot and apply it to the width; therefore, in any attempt at legislation this matter should be considered, as well as the general direction and width of streets.

Were I called upon to suggest points looking toward tenement-house legislation, I would say: provide first for a properly prepared foundation. It is well known that the more desirable portions of every city are selected for the better class of dwellings, while the tenement population is crowded to lower and less valuable districts, often consisting of ground reclaimed from swamps and marshes, and even from portions entirely covered with water. All such grounds are more or less defective in that the material used in filling contains usually a considerable amount of decomposable refuse matter. We can guard ourselves against exhalations from such material by properly draining the ground and preparing it with a thick layer of concrete, cement or puddled clay, sufficient to protect the foundation walls and cellar from moisture and ground air. Thickness of walls, quality of materials and other ordinary matters relating to the construction of a building, are generally provided for in the fire and building laws. The special legislation which is to apply to tenement houses, should provide for light, air-space, ventilation, drainage, the disposal of excreta and house refuse, water-supply and general cleanliness.

The admission of light requires, of course, windows of adequate size and number; but these may be so obstructed as to greatly impair their usefulness. To prevent this, massing of front and rear tenements should be prohibited, and the height of the building should be

regulated by the width of the street upon which it fronts. Narrow streets, bounded on both sides by rows of tall houses, are deprived of direct sunshine during a considerable portion of the year, and it often happens that for several weeks in the winter the sun is excluded from the lower stories of houses, on the north side of a street, by the tall houses opposite.

In regard to air-space, I would insist upon at least six hundred cubic feet to each occupant, and when a family increases beyond that capacity they should seek other quarters. There is a strong tendency to evercrowd tenements, which can be overcome only by strict and rigidly enforced legislation. More legislation is now being asked.

The law should provide that every sleeping room have at least one window of proper size communicating with the open air and capable of being opened to half its area. Where such windows cannot open into the street or yard, there should be a light shaft of at least twelve square feet area, extending from the ground to and through the roof, and so constructed as to allow an inlet of air at the lowest portion, that an uninterrupted circulation may be established. One objection, and a serious one, to this light shaft, is that it some times becomes a depository for filth and refuse of various kinds, exposing the sleeping rooms connected with it to foul emanations. This may easily be obviated by a wire grating or screen placed before each window, which, as it does not interfere with opening and closing the sash, will allow a circulation through the room. The arrangements for house drainage should be simple as possible, and yet, in construction, of the best material and workmanship. An uninterrupted communication with the out-door air, from a point in the main drain on the house side of the trap, through said house drain and main waste-pipe to a point above the roof of the house, is now, I believe, regarded by us all as indispensable. Sinks and other fixtures to be connected with the main waste should be simple and arranged in accordance with the best knowledge of the day. For the removal of excreta, I believe it advisable and possible to abolish the privy vault by legislation. This relic of barbarism is not only unnecessary for our convenience, but is a most disgusting nuisance wholly incompatible with our civilization. It should be emptied, cleaned and disinfected, and then filled with fresh earth. It is not so easy, however, to legislate a substitute any farther than to provide for some receptacle in which no

accumulation can take place. The substitute, which to a large extent is now taking the place of the privy vault where there is sewer connection, is the trough closet. The following is our specification as to it:

"That a receptacle, vault or sink be constructed of a depth not greater than two feet, which shall be impermeable and secured against any saturation of the walls or ground, and shall be connected at the upper end with the Croton water, and at the lower end with the street sewer, and provided with an outlet at the lowest point and on the bottom so as to admit of flushing with water daily, and the complete discharge of the contents whenever the outlet is opened. The outlet shall be kept closed, except during the process of flushing, with a tight-fitting plug, so as to effectually prevent the escape of foul gases and offensive odors; and sufficient water shall at all times be kept in the vault or sink to prevent solid matter adhering to the bottom. The bottom thereof shall be so inclined that the lowest point at the outlet shall be at least six inches below the lowest point at the opposite end."

It is not quite up to the spirit of our day, but it is up to the intelligence and habits of a portion of our tenement population, who still need to be further educated on this subject. I believe, however, that in the near future we shall be able, either by State or municipal authority, to introduce the water-closet into even the lowest class of tenement houses. It is now being done with success in the city of Dublin, where it is to be the only system in all classes of dwellings; and many owners of the better class of tenement houses in the city of New York have already placed water-closets in their houses. To be successful with this system, the closet should be of a kind as simple as possible, and with automatic flushing appliances of sufficient capacity to insure adequate flushing and cleanliness. Several of the improved hoppers now in the market would fill all indications, and be entirely safe in the hands of a large majority of well-meaning tenants. Where no sewers exist, we must resort to the dry system, for which the receptacle should be small and frequently emptied. Either dry earth or ashes will prove a successful deodorizer. The removal of ashes and garbage require prompt action on the part of public authorities, as well as on the part of the landlord. It is the duty of the latter to afford means for delivering the refuse to the public cartman, while the authorities should see that the cartman's rounds are made at regular intervals that the refuse may be promptly removed. General cleanliness cannot be effected without an adequate supply of water, the

importance of which is too obvious to need or even admit of any discussion. It should not only be brought to the premises, but to every floor of the house, that each family may use it freely. Cleaning, whitewashing, etc., of halls and such parts of the house as are common to all the occupants should devolve upon the landlord, while the tenants should be held responsible for the condition of their own apartments.

In every tenement house there should be some person with authority to exercise a general supervision over the premises, to abate and prevent the recurrence of nuisances, see that the house is kept in proper repair, be cognizant of any sickness among the tenants and promptly report to the proper authorities.

The occupation of any portion of a tenement house for other uses than as a dwelling should be restricted by law. And here I would begin by abolishing the ubiquitous saloon that exerts such an influence in degrading our tenement-house people. When we obtain a law forbidding the sale of intoxicating drinks in any portion of a building occupied as a tenement house, we shall have done something towards elevating a large class of our fellows. Other industries, such as storing rags and hides, and everything included in the catalogue of offensive trades, using the lower portion of the building as a stable, etc., should be forbidden. Finally, the builder should be required to file in the office of the sanitary authorities a detailed plan of every house he proposes to build, including the plumbing and fixtures, where it should be kept for subsequent reference.

So far, the legislation proposed affects the tenement-house owner alone, and although it is in no degree severe, I believe the tenant should bear his share of responsibility for the condition of his home, sanitary and otherwise. There are nuisances detrimental to public health which often occur in connection with the tenement house, wholly unknown and even unsuspected by the owner, and for which the tenant, either from stupidity or vicious inclinations, is alone at fault. Tenement-house reformers are too apt to extend all of their sympathies to the poor tenant, who is regarded as the oppressed victim of an avaricious landlord. While the deserving poor need, and should receive our sympathies, we must recognize the fact that there is another class to whom the landlord is the victim. I refer to that class of ignorant, vicious people who appear to regard their landlord as a natural enemy, whom it is their duty to injure as much as possi-

ble. Against this class of people he has but little protection, and I do not know that much could be afforded by legislation. I would, however, give him the power to deal with such tenants by summary ejectment whenever they are found violating any of the sanitary regulations. Were it possible to eliminate this class of people from the general tenement-house population, there would be less cause to complain of the sanitary condition of tenement houses, since the law gives us so much control over all constructive arrangements.

WATER-SUPPLY.

BY EZRA M. HUNT, M. D.

The question of water-supply can never cease to be of prominent importance in all considerations of public health and comfort. The necessity that it shall be abundant and easily accessible is imperative for purposes of cooking, of cleanliness, of provision against fires, of manufactures, and for use as a drink. As a great financial and economical question, it has to do with general material interests, while, in its bearings on personal health, accurate and correct knowledge as to it is of the first importance.

As the original fountain of all water-supply is above the earth, instead of in it, it is a very natural question why we do not gather it as it comes fresh from the clouds, instead of drawing it back again from the ground. There is so much force in the inquiry as to have led many to claim that not sufficient reliance is placed upon rain-water for potable or drinking-water use.

Denton, in his work on sanitary engineering, says: "I hold the opinion that, in fact, there exists no more certain source of a pure and sufficient supply than that of properly collected and properly filtered rain-water, which is, with care, to be secured by all persons alike.

"Rain-water collected from clean surfaces is itself so free from pollution that it requires filtration only to protect the consumer against the accidental defilements of mold, soot, and those minor organic impurities which occasionally collect on roofs."

Even the necessity of filtering depends very much on locality. The purest natural water is rain-water. Whilst, in its descent, it comes through the air, the amount of mineral or organic matter with which it comes in contact is very small, except in cities dense with the smoke from manufactories. It is both theoretically and practically far less than when it is drawn from the ground. It has advantages of oxida-

tion and purification fully equal to those occurring in the soil. It is especially free from organic matter. While we do not propose to give it undue prominence over all other sources of supply, yet there must ever be, in parts of this State, much reliance upon it. There will always be places where "rain-water from roofs, or prepared impermeable surfaces, constitute the only source of supply for separate dwellings." We, therefore, briefly outline the mode of its collection and preservation. It is best collected on slate roofs. The leader should always be so arranged as that the first rain can wash off the roof and not discharge into the cistern. Two or three automatic arrangements are used for this purpose. This prevents any fouling from the dust of roofs, the excrements of birds, from leaves, or from the "cellulose or weather-beat" of shingle roofs, if they are relied on. If a leader ends in a hogshead or tank proportioned in size to the roofs, it can receive the first washing, and, when full nearly to the top, an overflow into the permanent cistern will carry off the pure incoming stream, and leave the former to be used for non-drinking purposes. It is best, also, to have the mouth of the leader, as it leaves the roof, protected by a copper gauze, or a galvanized wire covering, so as to prevent any lodgment of leaves, etc.

Whether the cistern shall be near the roof in some upper room, or whether it shall be in the ground, will depend much upon convenience and locality. If near the roof, it should be well built, preferably in a circular form, or, if square and lined, should have such lining as will not furnish lead or copper or too much iron to the water. The overflow should be so arranged as not, when its pipe is empty, to be an open tube to convey foul gases to the water. It, therefore, should not enter into the general soil pipe. The cistern, while constructed so as to be accessible for cleansing and while generally needing a covering, should not be so made as to confine stifled air over the water, but admit of some circulation. As water kept near the roof is apt to become very warm in summer, some devices similar to those used for the preservation of ice are sometimes resorted to for keeping the cistern cooler. Most prefer a cistern in the ground, which then should be deep enough to keep cool in summer and not to freeze in winter, or to be cracked by the action of the frost. As the weight of water is ten pounds to the gallon, the receptacle for any large amount needs to be made strong. Cast-iron or wrought-iron tanks, properly painted or dipped, after the Angus Smith method, are now often used. The circular form is generally the best, as it gives the most strength. The capacity

of the cistern should be ample, as it is best to store the water of long rains rather than that of occasional summer showers. The reason for this is that the first rain-water washes out the impurities in the air and upon roofs. A tank or cistern holding one thousand gallons would be contained in a space six feet square and four and one-half feet deep, or in one of five feet square and six and one-half feet deep, or in a circular cistern of five feet in diameter and fifteen feet in depth. If we reckon the average rainfall at thirty inches, or seventeen gallons a square foot, and allow a loss of six inches for the first water and short rains, and six inches for evaporation, "there would be left on the average roof of three hundred and sixty square feet, available for storage, five hundred and forty cubic feet of water, or three thousand three hundred and seventy-five gallons in the year, which, for the house, would be an average daily supply of nine gallons." "A tank sixteen feet long and ten feet wide will hold one thousand gallons in every foot of depth." The building of a cistern in the attic needs to be well done in order to prevent leakage. When made in the ground, much will depend on the soil. If a clay, the cement is sometimes applied directly thereto after an accurate circular excavation has been made. The cementing is mostly done on brick-work, laid in the best of mortar. Where bricks are used the coating of cement should not be less than one-half inch in thickness. Where the cement is applied directly to the sides of the excavation it is usual to put on three coats, the whole being not less than one inch in thickness. As cracking of the cement would not only cause leakage of the water, but also its possible contamination from outside sources, the cistern must be made in the very best manner. The top is usually covered with a stone flag or cast-iron plate, large enough to serve as a man-hole and air-hole. Such cisterns do not need frequent cleansing, but need examination occasionally as to their condition. Some prefer to build two smaller cisterns close to each other, relying upon one for the potable or drinking-water, and the other for the general supply. It is easy to arrange the inflow leader so as to shift it to the drinking water-supply and thus make selection of the time of filling.

FILTERS.

As the subject of filtration comes up in connection with rain-water as also with other waters, we shall here say much that is applicable to

all forms of artificial filtering. Its design is often three-fold. First, the removal of all foreign particles in suspension. The retention of dissolved matters which are in solution or too minute for the first process of straining. The aeration of the water, or a process of oxidation, by which actual change is wrought upon organic matter in the water. To this might be added sedimentation, which is merely the settling of particles which, being of a higher specific gravity, or greater weight than the water itself, settle to the bottom without any real filtration.

The first process is purely that of mechanical separation or straining, which, by furnishing some fine porous substance, separates many of the finer particles which would not settle soon or at all to the bottom by sedimentation. In large reservoirs settling basins are often used for this form of sedimentation. Even if filters have to be used, the opportunity given for the settling of the coarser particles makes the subsequent filtration more effectual.

It is seldom necessary to use such coarser methods for cisterns if the roofs and leaders are properly cared for, although the settling of such particles to the bottom of the cistern is a reason why no pipes of outflow should be as low as the bottom of the cistern, and also a reason for occasional thorough cleansing, or at least yearly.

The second method of action of a filter has been called that of adhesion. Prescott illustrates it thus: "A solution of organic coloring matters, though so perfectly free from suspended solids as to show no particles under the microscope, when passed through certain porous substances, leaves the coloring matter behind. The capillary attraction of the porous surfaces for the dissolved solids takes them out of solution. Dissolved gases are, to some extent, withdrawn from solution in the same way." The process seems to depend upon the fact that particles of sand, charcoal, or other substance, are so close to each other that no rills of water can flow between them, but only drops or minute capillary currents of the water. It is then brought directly in contact with the adhesive or absorptive surfaces of the material used, and so the very finest particles and the dissolved solids are retained.

If there is too much weight of water it is pressed too rapidly through the filter and so is not allowed time for this slower action. It is a rule in filter-beds not to have over two feet of water.

The third process, that of oxidation, although regarded by most as distinct from this, is closely associated with it. The water thus passed

minutely through adjacent surfaces, itself gets greater capacity for air admixture or adhesion, while the minute particles of sand or charcoal also allow much air between their surfaces. Thus the suspended or dissolved particles are especially exposed to air and undergo that process of oxidation by which organic material is destroyed. "The oxygen condensed by adhesion in the pores is extra active." By the minuteness of the particles of the filtering material and by compelling the water and the air to be jostled about in minute currents amid multitudes of solid inorganic particles, you get that motion which is always favorable to oxidation, and therefore to the removal of all changeable or decayable matter from the water. So not only is this removed but when removed the air and water aid in its destruction, and so help to preserve the filtering-bed in action. Yet, as often more air than is supplied by the water or by the aid in the filter material is needed, as a rule filter-beds should not be so constantly covered as to prevent access of the atmospheric air, for it is one of the conditions of a good filter that it should expose the organic matter which it catches to the largest possible amount of atmospheric air both during the act of its catching it and at intervals between, by the free access of air thereto. Sand, although valuable as a mechanical separater, is too porous to exclude all suspended matter, and if used alone, too fine by reason of its compactness, and does not favor a capillary flow either of the water or the air. Animal charcoal, and especially granulated animal charcoal, being closer in texture on the surface and more open in its particles, has a more valuable porosity, except that it is more difficult to make the water pass actually through its substance. "Due care of a filter requires that all suspended matter, *i. e.* floating particles, should be removed before the water reaches the filterer." Charcoal probably owes more of its value as a filterer to the minuteness of its pores or interstices through which the water in its minute circulation is brought into contact with air, than to any other property. Those who construct filters need to bear in mind such facts so as to adjust mechanical arrangements and the use of materials.

Filters also have a certain value in the more general aeration of the water. Thus, water which has been boiled and has a *deadened* taste, although free from organic matter, by subsequent filtration through aerated material has this overcome. The importance of occasional access of air to filters is such that Denton says that "all filtration in

which the filtering material is placed constantly under water, produces but an imperfect effect. To secure the best results the filtering material should be intermittently aerated." Air is a far better cleanser of a filter-bed than water. The idea, then, of a perfect filter is one which, by the mechanical arrangement of the parts or particles of which it is composed, secures the most perfect mechanical separation of every particle in suspension in the water; which, by adhesion to its surfaces or "mechanical entanglement" in its pores and the securement of a capillary circulation of air and water through it, secure the retention of all minute or dissolved matter; which also, by this arrangement and by intermittent exposure to air secures the most perfect facilities for the aeration of the water and oxidation of all organic matter in it." As there may still be an occasional accumulation of the collected matter, it should admit of occasional removal for cleansing. The chief idea of a filter is well illustrated thus:

Take any common vessel perforated below, such as a flower-pot, and put a small, clean piece of sponge over the hole. Fill the lower portion with gravel stones, over which place a layer of finer gravel and on these a layer of clean, coarse sand, the proportion of each being about the same.

On the top of this place a lid of unglazed clay, either very porous or perforated with small holes, and in this a stratum three or four inches thick of well-burnt, pounded animal charcoal. A filter thus formed will last for a long time, is easily cleaned and will be found to act both by mechanical and chemical purification. (See Blyth and Tardieu.)

The following are good directions from so good an authority as Dr. Parkes:

"The filtration of water is not difficult, even if you cannot afford to buy a regular filter. The compressed charcoal blocks are cheap and good; if they clog, rub them gently with a towel, or, if that does not clear them, with a hard brush; if they are still clogged, they must be gently scraped with a knife. But if the charcoal block is too expensive, a simple filter can be made as follows: Get a common earthenware garden flower-pot; cover the hole with a bit of zinc gauze or a bit of clean-washed flannel, which should be changed from time to time; then get some rather small gravel, wash it very well and put it into the pot to the height of three inches; then get some white sand and wash it very clean, and put that on the gravel to the height of three inches; then buy two pounds of animal charcoal, wash that also by putting it into a jug and pouring boiling water on

it, then, when the charcoal has subsided, pour off the water, and put some more on for three or four times. When the charcoal has been well washed, put it on the sand and press it well down. Have four inches of charcoal if possible. The filter is now ready, pour water into the pot, and let it run through the hole into a large glass bottle.

"After a time the charcoal will get clogged; take off a little from the top and boil it two or three times, and then spread it out and let it dry before the fire. It will then be as good as ever. From time to time all the charcoal and the sand also may want washing. The sand may be put over the charcoal, and not between it and the gravel; but this plan sometimes leads to the charcoal being carried with the water through the gravel and out of the hole. The sand stops it.

"By filtering in this way, and by boiling the water, many dangers are done away with.

"If you have a rain-water tank, always filter the rain-water before using it for drink or cooking, as rain-water often is collected from dirty roofs or becomes impure in the tank."

One plan of a cistern and household filter is given by Prof. H. B. Cornwall, in our second report, 1878, pages 100–102. A usual method is to have the part of the cistern which receives the rain-water partitioned off by a brick septum, smaller than the division from which it is to flow out. As the bricks are porous and made from clay free from organic matter, this method is often found quite efficient. The bricks are the usual hand-made bricks, often laid on edge with a good quality of mortar sufficient to hold them in place. Where the cistern is large, the circular or arch form is preferred for strength. This serves some of the purposes of a filter, but, because it cannot be removed for cleansing and is most of the time in the water, so as not to allow intermittent aeration, it is chiefly mechanical in its action, and if the water has much impurity will become clogged. Yet if, when the cistern is low, access is had to the wall, it can be thoroughly rubbed with a stiff brush, and air blown through the bricks by a strong common bellows, and thus its power of clarification be renewed at the time the cistern has its cleansing.

Instead of this, in small cisterns, a similar septum is encased in a strong iron frame-work, which fits into a groove into the cistern, and can be removed and aerated and cleansed when desired. This may be made of thinner porous brick, or clay. Charcoal is also thus used in form of blocks. With our State facilities for clay shaping, there is no reason why portable filters should not be constructed, either of brick specially made for the purpose, or a double row of slabs of clay

fitted to each other, between which filtering material of sand, gravel, charcoal, etc., can be used. Such a filter could be placed so as not to extend to the bottom of the cistern, but to form a kind of box.

Another plan, suggested by Prof. R. C. Kedzie, is very feasible:

"To remove matters held in mechanical suspension it is a good plan to provide a small filtering cistern, filled with clean sand, to receive the water as it flows from the rain-water pipes, carrying this water, after filtering through the sand, directly into the main cistern by a lateral pipe connecting the two cisterns.

"A very simple and inexpensive arrangement will exclude all insoluble impurities from cistern water as it is pumped out. This is constructed as follows: A brick box, twelve to eighteen inches in internal diameter and twelve inches high, is made with well-burned, hand-pressed brick (machine-made bricks are too hard and impermeable by water), laid up with water-lime (the bricks may be laid up edgewise), the box is arched over at the top, and through this arch the pipe of the pump passes inside the box, the pipe being securely fastened in the arch by water-lime. When the pump is worked, the water that reaches the pipe must pass through the brick, by which means all mechanical impurities are prevented from passing to the pump; the water is strained before it is pumped."

Denton, in his Sanitary Engineering (pages 40 and 143–144,) suggests two species of filters: one a box appended, in the tank or cistern, to the pump which drives the water into the house and serving to strain out suspended matter, and the other an oxidizing filter in the house, containing filtering material made of finely-broken stone potsherds and animal charcoal. This admits of aeration by intermittent filtration also, and is self-cleansing by letting the water itself be so turned on as to work out the filtering material.

Spongy iron, made of hematite, which is a common ore in this State, is also available as a filter in place of sand, charcoal, etc. The spongy metallic iron is so reduced from an oxide without fusion as to preserve its minute, particulate, spongy, porous condition, and in this form, answers an excellent filtering purpose. By washing and drying the layers or materials from which filters are made, we are often able to use them for a much longer period. Instead of taking the filter apart, it is often possible, after it is dry, to blow draughts of air through it. If twenty or thirty grains of solid potassium permanganate, and ten drops of strong sulphuric acid to a quart of distilled water, is poured through the sand, gravel and charcoal filter, and afterward three gal-

lons of distilled water, to which a half ounce of muriatic acid has been added, and then a gallon or more of pure water, the filter will be renewed. Other varied forms of filter, both patented and not patented, are in the market, but with the principles of their action thus made plain, a choice can be made.

We next come to that supply of water which is derived from the ground. Although originally from above, it is variously deposited or retained in the earth. That which is found in lakes and streams, in relation to animal wants, is generally known as the surface water-supply. It is that for which nature has its own reservoirs on the surface of the earth in rivers and streams, made to receive the drainage of water-sheds more or less extended. Sometimes this is spoken of as of two kinds, viz., the surface-water from uncultivated or sterile lands, and that from cultivated lands, since the kind of soil through which the water flows furnishes it more or less with the soil organic matters, which it contains, as well as with mineral ingredients. If the organic matter is so superabundant as not to be diminished by filtration through the soil, or oxidized by exposure to the air, it makes the water impure, while if limestone or other rocks abound, the character of the water is modified in this regard. Also, special plants may give a peculiar odor to water, or, when in very great abundance, may add to it much decomposed material. It has the advantage that being on the surface it is exposed to air and sunlight, and often, by its motion over rock and pebbly bottoms, is constantly aerated. How real is this advantage is sometimes illustrated by the freezing of rivers which are somewhat impure. Then, because of the exclusion of the air, the water which in the summer was not complained of, in winter becomes scarcely fit for use. The disadvantage of such exposed sources of water is that they are subject to various artificial sources of pollution from cities, factories, dwellings and soil enrichment on their banks. Where these sources of contamination abound, the water will be preserved longer by a sanitary patrol like that now exercised by the combined Boards of Jersey City and Newark over the Passaic river. This constant watchfulness now prevents from passage in to the river a great amount of crude sewage and factory products, which formerly were freely discharged into it.

Next is the water-supply derived from shallow wells. These wells are those which are fed by land or surface springs. Though some of them are spoken of as deep, "they depend for their water upon the

area immediately surrounding them, the rain-water falling upon which sinks downward and laterally toward the bottom of the well. The quantity procurable may be likened to the contents of a cone, the base of which is the area around the well, and its apex the bottom of the well, the contents being renewed from time to time as the rain falls. The extent of this area, or base of the inverted cone, is the greater the more porous the ground is for any given depth of well." Such is the water on which, in the absence of public supply, most depend. By passage through the ground strata, and by process of filtration and oxidation, it is usually pure, unless in its course it has derived contamination beyond the power of the natural forces in operation in the ground and air to neutralize. Not only are some soils, such as gravel and sand, more porous than others, but rocks, also, differ in porosity. Thus the new red sandstone is so porous as to act as a filter, and often removes much organic matter. Some forms of rock contain organic matter.

The next supply is that from springs. These are governed in position and depth by that of the different layers of the earth structure. Water finding its way to an impervious bed, has its springs or rivulets formed along that bed, or a water-level there maintained. The direction of the slope, or dips in the slope, or a sudden change in the formation, may allow the water to appear on the surface as a spring, or to be reached by a well. If these are not very deep they represent surface water of recent percolation through soil, and often rise and fall according to the abundance or lack of rain, and so, like the shallow wells, represent the ground-water.

Next we have the deep well which represents what is sometimes called the resident water or the more constant deep water level which is beyond the seasonal influence of drought or storm. To this class belong deep wells, driven and bored wells when deep, artesian wells and most springs of the deeper water-bearing strata.

Of these it may be said in general that supplies nearest the surface may be very excellent if only from the upper soil and surroundings there is no super-abundance of organic matter. They even have the advantage of the more active and continuous presence of air for oxidation purposes. Their risk is that pollution to streams or to wells or to soils about them are more easily added than to the deeper reservoirs.

The deep sources are much surer to be free of organic or decom-

posable constituents although sometimes altered in composition by the mineral ingredients they have found or with which they are brought in contact at their base.

As to each of these we only desire to single out the more important suggestions and precautions. First as to river and lake supply. Whether this shall be relied upon will depend upon the purity of the source, the character of the country through which it flows, the possibility of preserving it free from contamination such as would add to it decomposable organic matter, or such mineral matter as is harmful, or such taste either from mineral or vegetable sources as would give discomfort. If any such matters are added the question also arises as to how far these are self-correcting in the flow and exposure of the stream and what means can be used to prevent or neutralize the impurity. Also, as a test of actual condition we need the repeated examinations of chemists and the testimony of close medical observers, who, by actual statistics of sickness and death and close observation and analysis of cases, can be able, with reasonable ground, to have opinions which can serve as guides.

Where, owing to appreciable and definable causes, there may be contamination or cloudiness or discoloration or taste, it is to be considered whether filter beds or other methods may not avail for partial or temporary unfitness. Thus even the taste and smell from water plants, as from such as the nostochiæ species, are greatly improved by proper filtration.

The *character and condition of reservoirs* needs to be carefully examined, both as to cleanliness, and as to what is best in the agitation or aeration or protection from heat of the impounded water. For it is known that reservoir water is not always so pure as the source from which it comes and that there are often no comparisons of conditions and strange neglects of examination. We not infrequently find reservoirs that have not been cleansed for years or properly investigated to know whether they are in need of cleansing, with gates or other wood-work or appendages in an improper condition, and with adjacent soil contamination by reason of added pollutions. And wherever a city is supplied with water by a company it is especially important that knowledge as to these matters be sought by the corporate authorities. The reservoir at Camden has recently been cleaned with great advantage. The service pipes, too, are sometimes found in an improper condition, and those having intermittent supply

may need aeration. The growths and deposits on these have sometimes been such as to affect water. If the joints are caulked with organic material, as hemp, etc., the water is sometimes polluted and unpleasant to the taste. The plant life of reservoirs and pipes sometimes needs microscopal examination. Whether a river shall be used as the natural drainage for a water-shed for the inhabitants near it, or whether it shall be practically the water-carriage for sewage, or whether it shall be the source of water-supply, is often a difficult and always a relative question. We must incline to the belief that in the country, where the rain-fall is large and so many other sources of supply are available, that rivers should not be resorted to where water can be obtained from series of wells, gravel bed or other water-bearing strata, or impounded in reservoirs depending upon a supply high up amid uncultivated and comparatively uninhabited hills. This is accomplished by arresting the flow of the storms at a point high up in their course, where forests abound or where there are few inhabitants, and where it does not occasion great overflow of lands. Water thus secured is generally far better than that nearer the outflow.

Upland surface water from uncultivated grounds, which, after percolating through the soil, can be gathered either from springs or wells, or from a kind of elongated well in the shape of a reservoir on the edge of a hill, or so as to intercept a water-bearing strata, is by all acknowledged to be a most reliable source of supply, so far as quality of water is concerned.

The average rain-fall of the country must, with due allowance, be taken into consideration, together with the amount of water likely to be needed. For this State the general rain-fall is forty-four inches. One inch of rain falling on a square foot, gives rather more than half a gallon, so that forty-four inches of rain-fall a year represents a little over twenty-two gallons for each square foot.

There needs to be a careful study of the natural water-shed, its extent, what its loss is by rapid flow from the surface, by sun-heat and evaporation, and by any artificial interruption of or addition thereto. The character of the soil and of the underlying strata needs to be known. The Princeton Water Company, after a careful study of various sources of supply by competent engineers, concluded thus to intercept the supply from a gravel formation on a farm not very far from the town. "The water-works for the supply of Glasgow and

Greenwich, in Scotland, and those of Manchester, Sheffield, Barnsley and many other places in England, are admirable specimens" of the rain-fall of higher grounds thus collected and stored for use. Our own State gives many advantages for this kind of gathering, in cases where the rivers can more profitably be used for sewer delivery. While the supply is equivalent to that from shallow springs and wells, it is a choice of the advantages of percolation and storage, where there is freedom from the dangerous forms of organic matter. When such sources of supply are sought, the choice must be made by those who are judges; and it is seldom that such err in thus securing a good supply.

Many of the wells considered to be deep wells are not such in the technical sense. The Hydraulic Engineer, or the Geologist, by a deep spring or well as sources of water-supply, has reference to that source of water which is so deep as not to be directly affected by the rains of any one season, but which reaches down to that residual water in the earth which has a constancy of presence which does not directly depend on the supply given to it from above by any one season. Such water is generally free from organic matter because it is far from the presence thereof, and in its passage through the soil and the air which the upper ground contains it has been freed of all such substance. To this there are a few rare exceptions, by reason of the character of local deposit or strata or from fissures in the rock formation. Such water, however, by reason of pressure and the prevalent mineral character of the geological structure through which it passes or on which it rests, may have a mineral impregnation which imparts to it odor or may give it either disturbing or valuable mineral properties.

These various forms of wells are fully treated in the Geological Reports for 1879 and 1882. Whether in any given locality such a source of supply can be depended upon is scarcely known except by actual experiment. While these wells help to shut out organic matter from the surface by reason of the water being drawn through tight tubes, yet it sometimes happens that the earth does not pack closely around the tube and that the outside of the pipe will serve as a course by which foul surface or upper soil liquids will find their way directly to the little hidden well at the bottom of the tube, and so be drawn up without much dilution.

The various facts thus condensed and presented as to the sources

of water-supply, will serve to aid the reader in appreciation of the problem and the conditions involved in the securement of so important an essential to personal and public health.

TESTS OF THE PURITY OF WATER.

Too much dependence must not be placed upon the opinions as to the goodness of water which are given by the tasting of that which has just been drawn, or by persons accustomed to its use. Water may have no taste that would be criticised, or seem very refreshing to the thirsty one, even when dangerously impure. Then, too, by use we become accustomed to a particular water, and may prefer it quite independent of its real purity. Also, it seems to be a part of human boastfulness to claim that one's own well is the best in the neighborhood. Nor is it enough that no actual sickness has been traced thereto. It is marvelous how resistful some persons are to imperfect foods and drinks, and how the forces of a reserve energy of health either resist or compensate for depressing influences, or finally there is an adjustment that conceals the evil, or like an engine with a little extra friction, only demands the production of a little more propelling force. Yet there are others who are more affected, and all are making a wastage of resisting power that is more wisely and usefully expended in some other direction. While one need not live in constant suspicion of evil, where the methods of protection are simple and where occasional outbreaks of violent disease reminds us that neglect may be destructive of life, it is well to know how to avoid or correct the error. Often there is need of such examination of waters as can only be made by sanitary experts. The chemist, the physicist and those accustomed to study and weigh all the facts which determine the purity of water, may need to be consulted where the evil threatens serious results. The following ready tests, as suggested by Prof. R. C. Kedzie, of the Michigan Agricultural College, will serve to guide as to the quality of water:

"The following methods of testing such water are presented, not as the most complete possible, but such as any one can employ without the skill and appliances of the practical chemist:

"*Color.*—Fill a large bottle made of colorless glass with the water; look through the water at some black object; the water should appear perfectly colorless and free from suspended matter. A muddy or

turbid appearance indicates the presence of soluble organic matter or of solid matter in suspension.

"*Odor.*—Empty out some of the water, leaving the bottle half full; cork up the bottle, and place it for a few hours in a warm place; shake up the water, remove the cork, and critically smell the air contained in the bottle. If it has any smell, and especially if the odor is in the least repulsive, the water should be rejected for domestic use. By heating the water to boiling an odor is evolved sometimes that otherwise does not appear.

"*Taste.*—Water fresh from the well is usually tasteless even though it may contain a large amount of putrescible organic matter. Water for domestic use should be perfectly tasteless, and remain so even after it has been warmed, since warming often develops a taste in water which is tasteless when cold. If the water at any time has a repulsive or even disagreeable taste, it should be rejected.

"*Heisch's test for sewage contamination.*—The delicacy of the sense of smell and of taste varies greatly in different individuals; one person may fail to detect the foul condition of a given water, which would be very evident to a person of a finer organization. But if the cause of a bad smell or taste exists in the water, the injurious effects on health will remain the same whether recognized or not. Moreover some waters of very dangerous quality will fail to give any indication by smell or taste. For these reasons I attach especial importance to Heisch's test for sewage contamination or the presence of putrescible organic matter. The test is so simple that any one can use it. Fill a clean pint bottle three-fourths full with the water to be tested, and dissolve in the water half a teaspoonful of the purest sugar—loaf or granulated sugar will answer—cork the bottle and place it in a warm place for two days. If in twenty-four to forty-eight hours the water becomes cloudy or milky, it is unfit for domestic use. If it remains perfectly clear it is probably safe to use."

Wells sometimes change in the quality of water. This may be owing to something having fallen into the well, to a seam in the adjacent or underlying rock which has become saturated with filth from some distance or serves as an inlet for some cesspool, or from some sudden discharge or pressure from a cemented privy or some other source. More frequently it happens thus: A cesspool or slop-pipe, or other foul source of organic matter, has for a long time allowed the soil not far off to become saturated without any appreciable effect, because the amount was too small so to saturate the soil as to cause soakage therefrom.

"In the case of a well supplying one or two families only, the circle of measurable influence, as far as the height of the ground-water is

concerned, is quite small; but this is by no means the circle of possible contamination; for the water drawn from the well is not taken from that which falls within this limited area, but is taken from that portion of the ground-water which happens at the time to be passing through the well, so to speak. In most cases, as has already been stated, there is a movement of the ground-water, and it sometimes happens that a source of contamination may be very near the well without affecting it, owing to the fact that the direction of this movement is such as to carry the drainage away from the well. If the supply of water be abundant, it may be possible for offensive or injurious matter to be so diluted that no perceptible effect is produced on the well; but, as the ground becomes more and more charged with decaying substances, the danger of future contamination becomes greater."

Where a well or other source of water-supply has been found and proves satisfactory, it should be considered such a treasure as to be most carefully preserved. The owner should not allow any source of soil contamination to occur within a hundred or more feet of it, and no storage of any accumulated filth within two hundred or more feet of it, according to the character of the soil and underlying structure. If the soil about it is made very rich by fertilizers, or not thoroughly cropped, it may become a source of contamination. Much, also, depends on *the mode of construction* of reservoirs, wells, etc.

Should they be exposed to air.—This is a relative question. If a body of pure gathered water fills its receptacle very nearly or quite full, and is then covered by a clean non-absorbent cover, it may thus be kept so much from decaying leaves, organic matter, foul air, sunlight and heat, as to be comparatively better than if exposed to the free play of air and wind over it, which otherwise would be better. Facts as to taste, as to algoid growths, etc., seem to show that water impounded, as in reservoirs, may become "deadened" or stagnant, or be of different quality from that of the stream it comes from, even where the reservoir is not foul. This, too, has been found especially true, where it is carried through aqueducts which are not full and are not well ventilated, in which the sides, as well as the water, become impregnated. This does not occur in service pipes, kept full, from which supplies are being drawn, unless, by reason of a change of level or supply, there is at times partial emptiness.

Wells, too, may become stagnant when there is very little or any flow into them, or when heavy air settles in the well between the water and the top of the ground. As a rule, then, we would say wells are

better when exposed to the air, if the air about them is not contaminated, and if they are so located and exposed that currents of air can pretty freely circulate in them. But as wells often need to be closed for safety, or are located in the close area of houses, some have advocated that they be so walled about and cemented a few feet down from the top, and then so fitted with apparatus for drawing the water as that the well shall be sealed from the outer air, and the water depend for its supply upon the air drawn from the lower ground as a result of constant use.

Allied to this is the question whether wells are not benefited by modes of drawing apparatus which go down into the water and agitate the air above it, as also the water, and so aerate it. It has been claimed that the old oaken bucket thus aided to purify the water, and that chain pumps and other modes of drawing, which stir the water, have this effect. When we know how water can be aerated by pouring from one vessel to another, and that air in holes becomes stagnant much more than most suppose, we regard it as wise to have open wells where proper protection and situation will allow it, and where the water is agitated in the drawing. We especially object to surface wells located in cellars. Open wells are easily protected by a cover or screen of perforated metal work. Both for the purity of air and of water, all dug wells, whether open or closed, should have the walls cemented at least six feet or more down from the surface, according to the character of the surface soil. This helps to secure the influx of the water into the well from a lower level, so that the water drawn is either that which is from a lower strata or water-level, and spring-like, or that which has been forced to go through a soil percolation down to this point.

In excavations for wells, care must be taken to have them exact circles, so as to secure a stronger and more accurate construction of the lining.

Where, because of the looseness of the soil, a curb is needed, oak, elm or yellow pine plank or boards are generally used, because if wood is used it is desirable to have that which has no unpleasant taste and which will last long under water without decay. Brick of good quality and of a circular form are now preferred to stone, as the placing can be more accurate, and they admit of closer binding by mortar or better covering for the part needing cement. It is important not to place wells too near trees, as not only do the roots often

impregnate the water, but by their presence disturb the lining. The careless construction of wells too often leads to their deterioration. Ernest Spon, in his work on "Sinking and Boring Wells," says: "Too much care cannot be bestowed upon the steining (the cylinder of brick work). If properly executed it will effectually exclude all objectionable infiltration. * * * Half the wells condemned on account of sewage contamination really fail because of bad steining."

The steining of the well should always be carried above the level of the ground, and some of the cement used outside as well as inside, for the upper courses of brick. It often happens that wells become contaminated by slops and spilling about the top. Vessels are carelessly rinsed or slops thrown out until all the soil about is kept damp or over-saturated with filth, ready to be stirred into activity when sun or temperature favor. We know of one well in the State long known as the "Sickness Well," because of fatal cases that were probably attributable to this very cause. After a thorough outside cleansing and a change of method it became entirely pure.

If wells are thus finished and graded around so as to form a slight descent, and then covered level with a flat paving stone, thorough protection is insured. The size of hole in the stone will be governed by the views held as to ventilation and by the form of apparatus used for drawing the water. Allusion has already been made to such as agitate the water. Where the simple action of an exhaust force is sought, the only point is to have the material, of which the barrel or pipe is composed, such as will not, itself, defile the water. Wooden pumps often become very objectionable, because of the decay and the taste of the wood. Stone or burnt tile pipes have sometimes been found very satisfactory. Where metal is used it must be such as will not injure the water or too much affect the taste. Lead tubing is not recommended, as it damages some waters more than others. Where lead is constantly in the water, or where the service-pipe is constantly full, it is claimed that there will be no action of the water on the lead. Iron in some form is extensively used for water-carriage. The tube through which the water is drawn should rest on a center stone and be made firm on the bottom. Many prefer a tube sealed at the bottom, with holes in its sides just above, so that no sediment is pumped up. The spout should have under it a shallow trough to catch all drippings, from the lip or end of which the water can run off, so as not to soak about the well.

We have been specific in detail as to the construction of wells, because so often the impurity of the water is the result of such neglects on the surface and the platform of the well, as foul a water otherwise pure and wholesome. Many of these suggestions apply equally to cisterns. When water suddenly becomes foul, if other water cannot be gotten in its place, none of it should be used for drinking until it has been boiled and aerated, by pouring from one vessel to another. Such precaution often prevents sickness. The well should be thoroughly cleansed and all possible sources of contamination examined. The removal of the water from the well not only gives a new supply running in, but agitates both the air and water, and gives opportunity to examine into the character of the inclosure and the streams that are running in. We know of a case of typhoid fever traceable to a well, in which a cleaning out showed foul streams running in from one direction, while on the opposite side the water was entirely good. It was a very dry season, and it seemed as if on one side the water level had reached some foul deposit in the ground, as no outhouse or cesspool was near. That such occasional drifts or unchanged deposits of foul organic matter, both animal and vegetable, do occur, is well authenticated.

As it now frequently happens that the water is introduced into houses from outside wells or cisterns by means of pumps, care must be taken that the tubes through which the water is drawn in its passage through the brick or other lining of the well, are well fastened and cemented. Cases occur where such metal tubes passing through the soil, make, on their outside, courses along which foul liquids gather and trickle into the well.

HOUSE FILTERS.

Sometimes water may become turbid by reason of innocuous coloring matter from recent rains, or from the color of the soil, as peat or shale, or may have in it some organic matter from some sudden cause. It is in such cases that house filters are sometimes used to advantage. We have already discussed the principles of filters in connection with cisterns. Several patent filters are in the market, of more or less value. They differ chiefly in the methods in which they make available the usual filtering materials and in convenience for their removal. Some of them are arranged so that the water filters upward through them,

such as the syphon and pipe filters. Wool and canton-flannel will separate much of the grosser material, and answer well for a first cleansing, so that the water may be readier for the action of more thorough filtration. Layers of coarse gravel, finer gravel, coarse sand, finer sand, and charcoal, in about equal proportions, form the basis of most house filters. Parkes speaks very highly of filters made from spongy iron and from the magnetic carbide of iron. "On the whole," he says, "a very purifying effect is produced even on dissolved matters." Since the bacterial hypothesis has come in vogue, it is claimed that the smaller forms of vegetable or animal life are not destroyed. But these are mostly ephemeral in their life, and water not intensely fouled, that has been thus treated, has not yet been proven to contain any specific varieties. While usual potable water should be too pure to need filtration, these domestic filters may be very valuable as temporary expedients.

Now that so much attention is given to public and private water-supply and so many investigations are being made by competent men, the use of unhealthy drinking water is a fault before it is a misfortune, and arises far more from carelessness, ignorance or lack of forethought than it does from necessity. This is as true in public as it is in private supplies. It is seldom that a case of contamination happens but that it reveals an absence of proper vigilance.

HARDNESS OF WATER.

"Lime salts are the chief cause of hardness in water; compounds of magnesia, iron, and other elements, however, may contribute to that soap-destroying power of the water, which is practically meant by the term. Chemists recognize two kinds of hardness: 1. Temporary, which is caused by the presence in the water of those elements held in solution in consequence of the presence of carbonic acid. By boiling the water, the carbonic acid holding them in solution is driven out, and the compounds in solution in consequence of its presence, separate in the solid form, and can be removed by filtration. 2. 'Permanent' hardness, which is caused by the above bases, which are in combinations not converted into the insoluble form by boiling—sulphates, chlorides, etc., chiefly the first named. The temporary and permanent hardness together constitute the 'total hardness.'

"To express the hardness in some tangible form, the usual custom in this country and in England is to give results in the corresponding amounts of carbonate of lime, *i. e.*, practically to determine the amount

of soap destroyed by a measured quantity of the water, and then to state the results as the amount of carbonate of lime which would destroy that quantity of soap."

Thus water which does not form a suds or lather, curdles, and so wastes the soap. This curd is a precipitate formed by the combination of the soap with the lime and magnesia in the water.

"The hardness has much significance upon the economic side. Hard water is objectionable for domestic purposes, in washing, and for manufacturing purposes in boilers. Linen cannot be washed with hard water, and other materials not as well as with soft water. With regard to its effect upon health, the English Commission took a great deal of testimony. (Sixth Report, pp. 184 to 194.) One witness said that soft water was more conducive to health, as people were more apt to be cleanly when they had soft water to use; another that lime-sulphate in the water appeared to disagree with some persons; another that the death-rate was apparently a little lower in towns supplied with moderately hard water. About ten to fourteen degrees of hardness per gallon (fourteen to twenty per hundred thousand), was deemed by some to be beneficial. The question of the connection of the hardness of the water with the death-rate was investigated, and from numerous statistics taken in the United Kingdom, it was found that there seemed to be no necessary connection. The conclusion of the commission was, that though there were some differences of opinion 'there is almost absolute unanimity as regards the wholesomeness of soft water.' Popular prejudice runs in the same direction, especially when comfort in washing, and economy of soap and boilers are taken into consideration, while for sanitary purposes no objection can be urged to the use of soft water, other things being equal."

As all the water in the limestone regions of this State, and much of that in the red sandstone and some in other parts is hard, we need to be fully aware of its effects. Boiling removes the temporary hardness, but not that known as the permanent hardness. A process known as the Clark process remedies the former, but not the latter, and so becomes a test between the two. This permanent or unremovable hardness, if of much amount, renders the water undesirable for drinking purposes, although it can be reduced by carbonate of soda. The greater the permanent hardness the worse the water. By permanent hardness it is not meant that no chemical process will remove this hardness, which comes mostly from the sulphates (as gypsum, etc.) Distillation and sufficient quantities of soap or carbonate of soda will remove this. But the process is expensive and complicated, and so it

has been called permanent hardness, in contrast with that easily removable. Although most of our hard waters contain, in addition to the carbonates, some of the sulphates, yet when the former is removed they are greatly improved for cleansing purposes.

"Every degree of hardness means that one gallon of water contains one grain of carbonate of lime (common chalk); there are 7,000 grains in a pound weight; therefore, 7,000 gallons of water of one degree of hardness would contain 1 lb. of carbonate of lime, and that would waste 8½ lbs. of soap. But nearly all waters, except rain-water, are much harder than this, their degrees reaching 10, 15, or 20, so that if we were dealing with a water of 20 degress of hardness, our 7,000 gallons would waste 170 lbs. of soap. This quantity of water would easily be used in a year by a family of say seven persons, if we include the washing of clothes, so that, with soap at only 3*d.* a pound, we have a pure loss of 43*s.* per annum in this item alone, or an amount equal to the income tax upon £100. There is also to be added loss caused in cooking, making tea, &c. For persons who get their living by washing, the importance of using soft water is very obvious."

AS TO THE REMOVABLE HARDNESS.

"To determine whether water is hard, we take a gill or thereabouts in a flask and add to it a clear solution of soap in alcohol. If the mixture is then shaken and remains clear with an abundance of soap bubbles over it, the water is soft, but if it becomes white, and curdy-looking masses form and float in it, and no bubbles appears on the surface, it is hard water.

"The hardness is caused by salts of lime and magnesia which are in solution in the water. These salts render the water unfit for washing, as they destroy soap, and they are troublesome in tea kettles and in steam boilers, on account of the incrustation which is formed as the water boils away. But hard water is not specially unwholesome, and it is common to find well-waters containing from 10 to 60 or more grains of solid matter to the gallon, which have been used for years without any injurious effect, though sanitarians recommend that water containing more than 17 grains to the gallon be not used.

Hardness implies one grain of bi-carbonate or sulphate of lime in a gallon of water. Water at or below six grains of hardness to the gallon is not objected to. The report of the State Geologist makes ten grains of hardness to the gallon the limit. Whether the removable hardness injures health cannot always be determined, but as it may cause dyspepsia, diarrhea and calculus, and adds a material not

needed for digestion or assimilation, it is better to use the softer water. The incrustation of boilers by hard water and, which is much worse, from the sulphate hardness, and the great wastage of soap caused by it, are worthy of great economic consideration. The water of Worthing, in England, for instance, is so hard that in one thousand gallons of water twenty-eight and one-half pounds of soap are destroyed or curdled before any lather will come. In the Thames water it is over two pounds, in that of Manchester only about three pounds, while in the Loch Katrine supply of Glasgow it is only two-fifths of a pound. It is easy to see that if such large amounts of soap are thus wasted, and if there may be some peril to health, the hardness of water should be considered in its introduction or remedied afterward. Water kept boiling about a half hour loses most of this removable hardness. Such water, poured on thin slices of well-burned toast, is found to agree with some who, from stomach or kidney disease, are susceptible to mineral ingredients. The Clark process, as described by Church, is thus carried out by the East London Company:

"Slake 18 ounces of freshly-burnt quicklime in a little water: when the lime has fallen to powder, add enough water to make a thin cream with this powder, and stir the mixture in a pail. Then pour this cream into a cistern containing 50 gallons of the water to be softened, rinsing the pail out with more water, but not pouring out any lumps of lime that may have settled. Let into the cistern the remainder of the 700 gallons of water which 18 ounces of lime can soften, and take care that a thorough mingling of the water and lime occurs. The added lime seizes the carbonic acid gas which held the carbonate of lime in solution, and so both the original carbonate of lime and that formed in the process fall together as a white sediment. This takes some time to settle—from 12 to 24 hours—but the water may be used for washing before it has become quite clear. This process is carried out on a large scale at Canterbury, Tring and Caterham. At Canterbury 110,000 gallons are softened daily by the addition of 11,000 gallons of lime water, the total impurities of the water being thus reduced from 23½ grains per gallon to less than 8½. And not only are hardening matters thus removed, but organic substances as well. The process purifies, to some extent, as well as softens; and the method is not only effective, but cheap. It would require 20¼ cwt. of soap, costing £47 1*s*. 8*d*., or 4¾ cwt. of carbonate of soda, costing £2 17*s*. 6*d*., to soften the same quantity of water which could be treated by Clark's process for 8*d*., the cost of 1 cwt. of quicklime.

"The hardness of water is a great defect. Already we have shown some of the drawbacks to the use of a very hard water: others may

be named. In preparing articles of food by boiling them in water, we find that they do not get so well done in hard water as in soft; indeed, it is a good plan to boil the water first before using it for such purposes. Greens, boiled in hard water, acquire a dull gray color, as the earthy matters of the water are deposited upon them. If they are cooked in boiling water, which has also been boiled some minutes before, and especially if a small pinch of carbonate of soda and a little salt be added, this defect will be remedied. For making tea with hard water, it is allowable to use a little carbonate of soda, but a great deal too much is commonly employed. For cleansing the skin, hard water is not nearly so efficient as soft."

Thus we claim that all water extensively used should be tested both as to its total, its removable and its unremovable hardness. Where any other inorganic or mineral ingredients of water are suspected to be present in undue proportions, they may be detected by further analysis. In the cretaceous formations of the State, iron pyrites or copperas (sulphate of iron) are common, and the water often has a slightly astringent taste and blackens tea. Soms of the waters are blackened by peat or by the cedar beds of some swamps. It has been claimed that the slight amount of iron and of cedar and pine present in some waters of the State exercise antiseptic powers and so prevent disease.

It is encouraging that there is in every part of the State so much attention now given to inquiry as to sources of water-supply. Yet it is evident that each family needs for itself to have a certain amount of knowledge as to possible sources of pollution. In the case of cisterns, springs, shallow or deep wells, we need to know that they are so made and used as not to expose them to contamination such as is generally an extra demand on the vital forces and too often causes actual disease and premature death.

ON FILTRATION.

PROF. GEORGE H. COOK.

By filtration, I understand the clarification and purifying of water for culinary and household use. The rapid increase in population, and the great number of manufacturing establishments, all over our Eastern States, is every year rendering the stores of water in the ground, and the streams which flow from the surface, and even the rain which falls from the clouds, more impure. Our well-waters, our lake and river-waters, and even our cistern-waters, are liable to be contaminated with impurities—some disagreeable, others dangerous, and all undesirable—and yet from one or other of these we *must* get our supplies.

How shall we accomplish this end, and at the same time get our supplies pure and wholesome? The answer, in general, must be, by filtration.

The term filtration is by some understood to mean only the straining out from a fluid such particles of floating solid matter as renders it roily or otherwise objectionable in appearance, while others understand by it the removal, not only of the solid floating particles, but also the substances which may be dissolved in it. The first can certainly be done, and the other only to a limited extent.

Water, to be wholesome and acceptable, should be clear and colorless; it should also be free from any organic matter, especially that which is of animal origin, but it is not necessary that it should be entirely free from mineral matter, such as the salts of lime and magnesia, which give the hardness to water. Hard water, even up to that containing fifty or sixty grains to the gallon, is not unwholesome for drinking, though it is very unfit for washing or for making steam. Water which is made hard by the presence of carbonate of lime, may be made soft by the addition of a proper quantity of quick-lime; but sulphate of lime, which causes the hardness in most of the waters of this country, cannot be economically filtered out or separated.

The natural filter of earth, through which the rain and surface-waters have passed to get into our springs or wells, is composed of the earth and sand which everywhere covers the surface. The water, as it descends through these surface materials, loses the impurities which have given color or opacity to it, and at the same time it dissolves and carries along with it more or less of the minerals it has passed through. Such is the water of our springs and wells when the country is new or thinly sttled. But, as more water is drawn from the wells, and the rain-water has to soak through, the surface impurities, which accumulate with increasing population, are carrried farther and farther downwards till finally the earth and sand will intercept no more of them, and the water passes in its impure, though possibly clear and sparkling state, to the wells, to become the cause of sickness with all its attendant evils. The surface-waters which formerly ran from mountains and forest lands, now run off from cultivated and enriched fields or from the roads and streets of towns and villages, and are still farther contaminated by the waters, impurities and filth which necessarily attend manufacturing processes. All these help to make the water in our streams more impure every year.

Many people still consider the well-water to be the best because it is clear and has the most taste, but the majority of people, especially in our cities and towns, take water from public supplies, which are mostly drawn from streams. Such water is liked because it can be drawn in almost unlimited quantities, directly where it is needed, without pumping or carrying. And, though not so pleasing in appearance, it is probably safer than the well-water. But both of them are dangerous, and something should be done to remove or diminish the danger.

In the case of water from streams, very little has been done in this country to improve its quality beyond what can be accomplished by having large reservoirs and allowing the water to stand in them some time, so that the matters suspended may settle to the bottom, and then to have a wire screen for the water to pass through, while fish or other objects, swimming or floating in the water, are kept back. The organic matters in the water are not removed. Such waters, when left to stand in reservoirs, undergo singular and disagreeable changes, especially during the warmer seasons of the year. Sometimes they have a musty taste and odor, some generate a fishy smell, while others are said to have a cucumber smell. It is not yet explained by what change these effects are produced. Fortunately, though disagreeable, they are not

generally dangerous. In some of them, as I have noticed, even boiling the water does not remove the peculiar smell.

In a case of stored water which came under my observation, where a most disagreeable and musty odor and taste was so strongly developed as to be extremely disagreeable, an attempt was made to correct it. The water, on close inspection, was seen to be just a little brownish in color and not perfectly clear. It obviously contained some organic matter. The reservoir of water was about eight feet deep and contained near 4,000,000 gallons. Two barrels or about 500 pounds of alum were dissolved in water and sprinkled over the surface of the water in the reservoir. In the course of two or three days a light scum of slimy coagulated matter gathered on the surface of the water, and was drifted by the wind to the bank. The water itself became perfectly clear and colorless, and its disagreeable smell and taste had disappeared, and this improvement in quality continued several weeks. A like trial has been made on two or three other occasions when the water had developed this disagreeable taste, and the effect was the same in every case. The alum was not sufficient to affect the taste, and I do not think that any one using the water ever suspected there was anything unusual in it. And when the very small percentage used is taken into account, I doubt whether it is possible to detect it by any easy test. Five hundred pounds of alum to 4,000,000 gallons of water, allows 1 pound for 8,000 gallons, or 2 ounces for 1,000 gallons, or about $\frac{1}{30}$ of an ounce for a hogshead of water, and if expressed in the ordinary form of chemical analysis, it would contain only .0016 per cent. of alum.

The trials with this substance are not sufficient to warrant the recommendation of its use, although it is probable that most of the alum is removed in the scum. Still, there may be some well-grounded objections to purifying water in this way. Some more satisfactory and regular mode of purifying water is still needed.

What are called natural filters have been taken advantage of in some cases with success. "Bordering upon all rivers there are found at intervals narrow plains of gravel or sand, brought down and deposited there by the river under the varying positions of its channelway. When these beds of gravel extend to a depth below the bottom of the neighboring stream, they will always be found saturated with water mainly derived from that stream, and however turbid the water of the river, this underground flow will always be found clear, pro-

vided that we tap it at a reasonable distance from the channel-way." (Kirkwood on Filtration, page 17.) The water-supply of Newark was attempted by means of a natural filter of this kind. The pumping works are located on a strip of alluvial ground on the west bank of Passaic river, about a mile above Belleville. The surface is but little above high-water mark, and the basins are about 200 feet back from the border of the stream. Two basins were dug in this alluvial plain as deep as the water would easily permit, and they are each 350 feet long and 150 feet wide, walled up with vertieal stone walls, and so deep that water will fill them to the depth of 8 feet. The filtration in this way was satisfactory, and the quality of the water was good. The supply needed for the city is from six to eight million gallons daily. At the present depth these basins will not yield that amount, and they have been obliged to open a passage-way from the river and allow the water to flow in without filtration.

It is to be regretted that a more thorough trial of this natural filter has not been made. The sand and gravel is 40 feet or more in depth, and if the basins had been sunk deeper, the filtration into them would have undoubtedly been much more rapid. The pumps are so set that they will not now draw water from much lower than the bottoms of the basins at their present depth, and to get a fair trial of any increased flow would require some new and differently-arranged pumps. In other cases, instead of open basins, long covered underground galleries have been constructed of dry masonry as far in the ground as possible below the surface level of the river, and the water allowed to filter through the sand and gravel of the alluvial plain into these, from whence it can be pumped up for use. The works at Lyons, Genoa, Toulouse, Angers and Pesth, in Europe, are of this sort, and are said to have been eminently successful in providing a good quality of water. The same plan has also been adopted at several places in the United States. At Lowell, Mass., there is a filtering gallery on the north shore of the Merrimac river, parallel with it and about 100 feet from its edge. Its length is 1,300 feet, width 8 feet and height 8 feet. At Columbus, Ohio, there is a long filtering gallery on the border of the Scioto river. It is a brick conduit, 36 by 42 inches, bricks laid close over the upper half and open in the lower. It is 5,715 feet long, and is said to be one of the best examples of this mode of supplying filtered water. The same plan of construction has been followed in the works at Taunton, Mass.

The daily supply from these galleries must, obviously, be varied with their depth below the surface of the water in the river; increasing with the increase of depth. The European works of this kind, which are cited from Mr. Kirkwood's notes, gave a daily supply from each square foot of their bottom areas of 288, 147, 300 and 182 gallons, respectively. If the Newark basins had supplied water at the rate of 147 gallons daily per square foot of bottom surface, they would have furnished more than 15,000,000 gallons daily—but it is probable that these short and broad basins will not collect the filtered water as rapidly as the long, narrow ones—and their depth is not sufficient, at low tide, to cause any rapid inflow of water. The borders of the Passaic at these and at other places above Belleville, offer fine locations for these natural filters.

In the majority of cases where filtered water is needed, natural filters cannot be found, and resort must be had to artificial filters. The alarming and fatal effects of impure water during the visitation of the cholera in Europe (1849 and 1850), led to a thorough examination and condemnation of the unfiltered water supplied to cities, and to the compulsory construction of artificial filters in cases where polluted waters had to be used. They are now to be found in most of the large cities of Europe. The following description of a filter-bed is taken from Nichols' Water Supply, Chemical and Sanitary, p. 151. "Filter-beds, as usually constructed, are water-tight basins, some ten feet or more in depth, the sides built of masonry, and the bottom puddled or paved with brick and cemented. The area may be from 20,000 to 50,000, or, in some cases, even 150,000 square feet. In building up the filtering-bed, provision is first made for the ready collection of the water, by constructing, upon the floor of the basin, drains or channel-ways of stone or brick, laid dry; then follows a layer of broken stone, the fragments being three or four inches in diameter. This is succeeded by gravel, screened, so as to be of uniform size, a layer of coarse being followed by one or more layers of finer material; upon the gravel rests sand, likewise separated into layers of uniform size. The exact thickness of the different layers, and the extent to which the separation into the different sizes is carried, are subject, of course, to considerable variation.

"The water stands several feet deep over the surface of the sand, and is allowed to flow down through the filter at such rate as experience shows to be most advantageous. Naturally, when the sand is

clean, a greater quantity of water can be passed in a given time than when the sand has become clogged; practice differs as to the maximum rate, but it is seldom over six inches, vertically, per hour, and often less. At the rate mentioned, each square foot of surface would deliver 12 cubic feet (or $89\frac{3}{4}$ U. S. gallons) per day.

"When the beds become clogged so as no longer to filter with sufficient rapidity, the water is drawn out from them, and the upper layer of sand, for a depth of a-half or three-quarters of an inch, is removed. When, by successive parings, the thickness of the sand has been considerably reduced, that which has been removed is washed and replaced, so as to restore the original thickness; the waste of washing being made up with fresh sand."

With strict attention to these filter-beds, and the frequent removal of any impurities which collect on the surface of the sand and in its upper portions, these filters have met the requirements of sanitary bodies fairly well; but, when neglected, the effects are soon felt in the bad quality of the water.

Filter-beds have been constructed to filter the water supplied to the cities of Poughkeepsie and Hudson, New York, and they are working satisfactorily. Their general introduction is to be desired. And the expense and want of experience in their management, are probably the causes for their coming but slowly into use. Three filter-beds of 50 by 100 feet each, should be able to supply 1,000,000 gallons of water daily, and, at the same time, allow the cleansing of one of them to go on whenever necessary. The cost of such filtration has been estimated at from $6 to $11 per million gallons.

WELLS.

The water in wells is really filtered through the over-lying and surrounding earth. It becomes impure from the saturation of the earth with the impurities from manures, waste and refuse matters thown on the ground, and still more from sinks, cesspools and privies, which are so constructed as to allow their contents to sink into the earth. Such sources for pollution should be avoided, as far as possible, and the wells should be stoned or bricked up and the lining made water-tight by the use of cement mortar, so that water from near the surface can be shut out and only that from the very bottom allowed to enter. Where water enters from the sides of the well, and

there is any considerable depth of it, that at the bottom is likely to be freer from organic impurities than that near the surface, and it will be better if drawn from the bottom by a pump than from the surface by a bucket, though the latter will probably taste the best from its being better aired. The water from drive wells is safer than that from dug wells, on account of being drawn from a greater depth beneath the surface of the underground water, and, so, less likely to be contaminated with surface impurities.

RAIN-WATER.

This is liable to be contaminated by gases absorbed from the air, by dust and dirt which accumulates on roofs, and by the smoke which escapes from chimneys. It is usually soft-water, and the impurities, though disagreeable, are not dangerous, and when the water is collected in cisterns, which are securely covered so as to keep out surface-water, they furnish a safe supply for domestic use. Cisterns should be deeper than they are usually made, and more capacious. They would fill with cold water during the winter, and as the summer rain is warmer, it will remain on top of the winter water in the cistern, and if there is any overflow it will be of the warm water and not of the cold. In this way cistern water can be stored so as to be always cool, and from its low temperature it is nearly free from any changes which the organic matter in it might undergo at the usual summer heat. Filtering, however, improves rain-water. It holds back some of the impurities and leaves the water clear and bright. Filters for rain-water are made in a great many ways. They have been made of sand, of charcoal, of animal charcoal, of oxide of iron, of porous sandstone, of unglazed brick, etc. The filtering substance being placed in such a way as to require the water to pass slowly through it before being drawn out for use. A solid brick wall, laid carefully in cement mortar, makes a good filter. The bricks should be rather under-burned, and extending through from one side of the wall to the other, and the faces of the wall not covered with mortar. Water will filter through such a wall fast enough for the supply of a family, and if the rain all enters the cistern upon one side of the wall and is drawn out upon the other side, the water is clean and sufficiently pure. The storing of pure water in this way, for drinking, is worthy of more attention than it has received, and the quantity which can be stored from roofs is sufficient for all family use.

Wherever only unfiltered water from streams or wells or cisterns is to be had, its quality may be much improved by passing it through the small filters which are prepared for household use. There are great numbers of these, and it would not be profitable to discuss their merits at this time. The common bag of cotton flannel, or flannel, tied on the faucet of the water-pipe will greatly improve the appearance of drinking water, and will strain out many disagreeable objects. A tube or box with sponge in it will also be satisfactory in clarifying turbid water, and like the bags it is easily and quickly washed and replaced. Granulated animal charcoal in boxes or vessels where the water can filter slowly through it, improves its appearance and quality. Some of the best house filters are made essentially of this substance. Vessels having in them and near the bottom horizontal partitions made of porous brick or sandstone, so that the water can filter slowly through, and be drawn off below, serve a very useful purpose.

There are many filters for clarifying water for manufacturing purposes; their action is mechanical, and their description would be out of place here.

While the benefits arising from the filtration of water have been proved by many satisfying experiments and experiences, the chemical or mechanical changes which it undergoes are not well understood. By some, the changes which it undergoes are said to be due to oxidation, that is, to a chemical combination of the impurity with oxygen from the air, by which the original is destroyed and some new and harmless one is produced. Every chemist knows that substances which are porous or in fine grains have the power of attracting air or oxygen to their surfaces, and in the case of the porous substances, the amount absorbed is equal to a great many times the volume of the porous substance itself. This is notably true of animal charcoal, but it is very observable in sand or in fragments of glass. The organic matter in water, though it may be very active and dangerous, is in extremely small quantity, so that the amount of oxygen needed to consume it is very little. When the filters cease to act it is said to be because the oxygen on them is exhausted, and if they are taken out, cleansed, dried and put in their places again, they act as efficiently as at first. This explanation is plausible, and, though not entirely demonstrated, it applies to the known facts more closely than any other. Numerous chemical examinations have been made of samples of water before and after filtration. They generally show a small diminution

in the amounts of organic matter, but not by any means sufficient to explain the changes which appear to have taken place in the properties of the water. The dangerous effects of organic matter in water are due not so much to its quantity as to its quality. It may well be that in the process of filtration its dangerous properties are to some extent destroyed, while the elements of its substance still remain. This explanation seems consistent and may be accepted till some better one is found. The sanitary benefits of the filtration of water are so well sustained by experience, that we must advocate the adoption of plans for that end wherever water that is liable to contamination is used.

NOTES ON POPULAR HEALTH RESORTS.

BY THE SECRETARY OF THE BOARD.

The sea-coast of New Jersey has not only become the most popular resort for the American people, but has so rapidly increased in permanent residents as to have cities and towns and villages which have an increasing population each year, and which are destined to grow as rapidly as towns in other portions of the State. Indeed, some of them have already so far established their claims as serviceable for winter resorts as to assure a sustained population of this class, even although as to individuals it may be transient. Both as a material interest of the State and as a care of the public health, the Board early recognized the duty of a close and accurate observation of all places offered to the public as having sanitary inducements. We claimed the duty of close inspection, of apprisal of those pecuniarly concerned as to defects either through carelessness or ignorance, and of report to the public if these defects were not remedied. We believed that while owners should not be hastily attacked, and while no sensational statements should be made, the policy of long concealment should be ignored. No one can realize as do members of this Board the need there was of such examination and advice, and the results which have been secured. We can point to place after place where our first visits were occasions of persuasion, of protest, and sometimes of local denunciation, but where Health Boards, and often owners, became convinced of the correctness of views expressed, and proceeded, with greater or less speed, to remedy the evils complained of. For any health officer, a sanitary inspection along the coast to-day is in most cheering contrast with the experience of six years ago. Not that all was then bad, or that all is now good, but there has been a great increase of intelligence as to necessity and methods; and there is a general determination to have the sanitary arrangements complete. This has not been merely as to the most leading and vital concerns,

such as good water-supply and proper disposal of all refuse, but has extended to questions of drainage, of filling in, of ventilation, of housekeeping, and of the proximity of stables, slaughter-houses, pens, etc., to residences.

While eternal vigilance is the condition of health, and while the time will never come when the inclinations to filth and negligence will not need to be watched in all places where multitudes arrive hastily, stay for a while, and then as hastily depart, yet we feel assured that each year will witness more and more attention to the details of sanitary construction and administration. No doubt some contractors will still dare to cover over wet and boggy lands with sea sand without drainage, to build houses on the "scamping" system and to make a great boast about the concealed sanitary appliances. But we are now quite sure that their sin will find them out, and that it will not always be necessary to wait for an endemic or an epidemic to reveal defects. Hotel after hotel along the shore has had its sewerage and plumbing reconstructed. Pipes filled with solid grease; traps rendered useless by solid matter, by water evaporation or by syphonage; the soil about wells saturated with liquid compost, and other revelations made before their eyes, have quite convinced Boards of Health and owners that there must be a forsaking of imperfect methods, and that it pays to secure the best workmanship.

We can now point to many a hotel and boarding-house in the best of sanitary order, only needing good administration to secure its complete healthfulness, and local Boards so intelligent as to sanitary construction as to enter their protest if they see imperfect works in execution.

Beginning at the most southern resort, Cape May Point well illustrates some of the changes wrought. Nearly two years since, an examination there showed great imperfections by reason of hasty sanitary arrangements, and it was believed that only the newness of occupancy had saved, especially the winter and spring guests, from ill-health. The defects were promptly brought to the attention of the Land Improvement Company, which owned the property. After full inquiry, it was resolved to spare neither pains nor expense in providing for the hotels and for the town a system by which all debris from persons or from necessary culinary and household methods should be promptly removed. Proper ventilation was provided for inside closets and vents, to prevent the syphonage of traps. Pipes well laid in cement

and properly separated, carry all liquids to a large tank a long distance from the town. The fall not being great, several flush tanks are provided, which, while they secure adequate flush, have advantages over that kind of construction in which the flush is made by the foul liquids themselves. Grease traps are so built as to separate the grease, and thus still more secure the cleansing of the pipes and the purification of the liquids. The receiving tank or reservoir is closely cemented, an inner wooden curb being used, because of the looseness of the soil. Each day this liquid is pumped out by a small steam engine especially arranged for the purpose. This carries it to such parts of the large tract of land owned by the company as will allow them to adopt a system of intermittent irrigation. While this has not yet been perfected, and some questions of economical disposal are yet to be settled, the system itself, so far as the town is concerned, assures thorough removal of all fouled liquids, if only the administration is accurate. It is always to be borne in mind that the more elaborate the structural methods are, the more risk there is, if there is no overseer or if the engineer falls asleep and forgets to run the machine. But this town seems at present under more efficient management, and there is every reasonable prospect that it will become a favorite resort for winter and spring, as well as for the summer. The irrigation field will, however, need and must early receive attention, or we cannot call it complete.

Cape May City.—Extended improvements have been made during the last year at Cape May. An efficient Board of Health has impressed upon hotel proprietors the fact that a good system of sewerage will not atone for household neglects. Here and there we meet a boasting hotel owner who assumes he understands all about it. Defects are far more noticeable in such hotels than in those where owners have no sanitary devices of their own, but on so expert a question consult good plumbers and such members of Boards of Health as have made special study of sanitary matters. As a rule, every hotel owner should have a competent plumber each fall and spring to examine the entire system of inside pipes, and to put all in working order. Of course, stoppages are always attended to. Not so with leakages and other defects. While the outlets of the sewers of Cape May and the creeks made available thereof, need good sanitary oversight, there is no reason to believe there is any defect in the tides and ocean current, which carry all outflow far away. Yet the depth and incline of outfall

should be watched, and examination had as to any precipitation of sewage in these creeks, for while not now disturbing, it might eventually much affect the gradient and the flush.

Atlantic City.—The value of the water-supply is more and more appreciated. Where people go for health, rest and comfort, they should not be exposed to clouds of dust. So an abundant water-supply has to do with health in this respect, as well as for drinking purposes. This city, like several others, needs to be correcting the relations of the streets and of dust to health, and, by more extended system of watering, to be providing therefor. Last year it was announced that full arrangements had been made for an adequate system of sewerage. Owing to some delays on the part of the company, little has been done. A speedy completion of a system is now being pushed forward. We are glad to recognize that the local Board and its assistants have redoubled their efforts, and that a system of inspection constantly seeks to secure removal.

So long as human nature is no better along the sea-coast than it is in the middle or mountain districts, so long will crowded hotels and houses find it both troublesome and expensive to cart millions of gallons of fouled water a-half mile or a mile away. To avoid it the cesspool will be built, and the more it leaks the more it will be applauded, since there is so much less to cart. The only limitation will be that its overflow will be prevented, and that the soil or ground around will postpone the evil day, so long as, without croppage and the usual mode of appropriating organic decay, it can dispose of the suspended filth. But we have abiding faith that property owners and citizens will not abide this, and will show that any town is hospitable to its guests in protecting them from unseen dangers, as well as in providing fresh air, good food and pure water. Cities like this should compel property owners to use the sewers, when built.

Sea Island City, between Cape May and Atlantic City, and several smaller localities, have been chosen for development and give good promise of success. While it is impossible to visit all these, and many are only represented by a hotel and a few cottages, we have enough information as to them to show a determination to secure good sanitary conditions. Hotels, at such places, are now generally built by those understanding much as to sanitary construction, and mistakes are the exception rather than the rule. Yet it is known to us that occasional cases of local sickness occur, fairly attributable to incomplete sanitary arrangements.

Beach Haven is situated near the lower end of Long Beach, between Barnegat bay and the ocean. It is a quiet and popular resort. Before there is much increase of population, there is great need of some grading of the streets and proper provision for the discharge of surface-water. As it is, with the general low level, the proximity of meadows, pond holes and stagnant water are sure to detract both from beauty and healthfulness. The water-supply is, thus far, very safe, since it is rain-water collected from clean roofs and filtered through the partition walls of cisterns. Garbage seems to be carefully collected and disposed of. There is little or no dependence on cesspools, but all closet material is conveyed by terra cotta pipes to the bay. While it cannot be claimed that, for a time, so large a body of water is likely to be polluted, the flow requires care and watchfulness. Some of the in-door appliances have imperfect flushing of water and of air. So good a location needs a little more skillful sanitary oversight—not so much because of any present peril, as for security in the future.

The same remarks apply to several small places between Atlantic City and Sea Side Park.

Between this and Manasquan, Berkeley, Bay Head and Point Pleasant, are each attending with carefulness to sanitary matters. Chief defects are in inefficient drainage before filling-in low places, or in the attempt to make or to enlarge lakes where the surface pond does not justify that impounding of water and destruction of natural drainage which occurs where the pond is thus artificialized into a lake. Some of the so-called lakes along the coast should be drained or filled up; others should be reduced to their natural dimensions, and just a very few of them are to be cherished as consistent with good drainage. Some of these towns necessarily depend upon cistern water-supply and cemented outhouses. A summer inspector and a regulated scavenger and garbage removal do much to diminish risk, and we are glad to know that in some of these towns these temporary methods are efficiently maintained.

A careful examination has been made of all the localities between Manasquan and Ocean Beach, inclusive. These all fall under the general oversight of one Board of Health. Some defects in and about Manasquan, have been brought fully to the attention of the local Board.

The new locality of Brielle, near there, needs some attention to sur-

rounding drainage. The hotel itself relies upon a cesspool, with some slight improvement in general arrangements. The hotels under the control of one company, which include all the coast to a little beyond Spring Lake, were found, with a single exception, in good condition. This, there was every assurance, would be speedily remedied. The cottages have to depend more upon skilled administration, as generally they are not able to bear the expense of many constructive arrangements.

Some of the boarding cottages at Spring Lake have very complete sanitary arrangements. Most of the hotels on this part of the shore depend upon the dry and prompt disposal of all excretions, and convey slop-water to a distance from the premises or to the sea.

The filling-in now taking place between the Parker House and Spring Lake, and the effort to reclaim some of the land, seems to promise success. The subsoil of sand is covered with loam, and we are assured that attention will be paid to drainage and that the lake will not be made to overflow its natural bottom.

The plan at Spring Lake and the adjacent hotels contemplates a pipe system, by which there shall be removal, to a considerable distance, of all liquid refuse.

Brighton, just beyond Spring Lake, is well located. The sewage of its chief hotel finds exit into the sea.

At Ocean Beach, better attention than heretofore is given to sanitary administration, but there are still some defects. There has been a want of co-ordinate action and some meagreness of expenditure not in keeping with the commanding situation and the many natural advantages. Two of the prominent hotels are very defective in sanitary arrangements. The largest hotel presented a favorable contrast and seemed under good administration. It has arrangements for forcing the fouled liquids away from the buildings and for discharge into the sea. We since find that the hotels most to be complained of are outside the limits of the association.

Key East is a new locality which is being improved with great enterprise. Parts of it are not well adapted by nature for dwellings closely arranged, but if in the filling-in and the drainage are properly cared for, this can be overcome. Speculation does so much to please the eye, and is so apt to slight what is out of sight and yet indispensable to health, that it is wise closely to watch all new localities, many of which are presided over by engineers very competent in levels and

landscapes, but not informed as to the sanitary necessity. This does not at all apply specially to this locality, but is a warning needed not only along the coast, but at many points inland. We have found that the engineer here is intent upon thorough work. The emptying of the sewage into Shark river is not advisable, except under a closely supervised method.

Ocean Grove has a local Board desirous of the most thorough sanitary administration; while for a time defective in realizing or enforcing necessary changes, it has done a great deal of excellent service for the two past years. The artesian wells seem to be a success, and the supply of water is abundant. Important repairs have been made at the ocean end of the sewer system.

The plan is that of constant discharge into the ocean, arranged at a depth and at a distance under water to prevent any return.

Other resorts, such as Asbury Park, which trust to the ocean as the great reservoir, have intermediate close tanks near the shore to receive the fouled liquids from the sewers, and then at night, or at proper intervals, empty into the sea with the outgoing tide.

The question, Shall the sewage enter the sea, and, if so, how? is still under trial. It is a relative question. It is surprising to see how the practical answer, thus far, seems to vary along the coast. We know of one point where all garbage and floating material was carried on the beach of an inlet three miles or more from a city. Yet, a severe storm, which washed up the inlet and over its shore, brought down to the sea-beach of the city enough of cut lemons and other floating material to convince observers that at that point it would not do to conduct the foul materials into the sea.

At other points, for years the liquids from hotels have gone into the sea without the least ground of complaint. It is found, too, on sounding, measuring, or by other examinations, that while at one point the undertow is always out enough to carry everything away, at other points it is not. The same place changes somewhat in the course of years.

With such facts before us, the determination of whether any given place shall send its sewage to the sea, and, if so, whether directly by constant flow, or indirectly by intermittent or flush tank discharge, is a matter of close expert testing and careful local observation. We have had under careful inspection Ocean Grove and Asbury Park, and a few other places. We believe at these two places, and in the

case of one hotel at Long Branch, the outflow thus far has been fully successful.

As these outlets into the sea are usually tide or water-locked, and as there are other reasons, also, great care should be exercised as to the ventilation of sewers. While water-flushing is valuable as a mechanical motor, and to some extent as a pneumatic process, we need, also, the introduction of flowing currents of air at frequent intervals. Whether this shall be done by alternate openings high in the air, or just at the top of chimneys, or by street openings, is also a varying question. If sewers are well ventilated and are kept clean, and the houses or house connections are in good order, there is no reason, save an æsthetic one, why all sewers should not be built with a continuous open grating. But if sewers do become fouled, of course there will be odors from them. To this Mr. Simon has replied—if so, all the better, since such a warning odor is not likely to harm any one, if accepted as a proper and timely notice served on the proprietors to remedy the evil.

Both Ocean Grove and Asbury Park have signal advantage in that the ownership of land is such as to give the association of the former and the chief proprietor of the latter great facility in enforcing the laws, as well as great power of personal advice.

In Asbury Park, Mr. Joseph Bradley has, with wise foresight and intelligent appreciation, co-operated with Dr. Henry Mitchell, with the Health Inspector, and with other members of the Health Board, in measures for securing thorough sanitary construction and administration. Local separating methods, ventilation, flushing, etc., have been applied to the sewer system, and where questionable plans have been tried they are watched and abandoned or modified as skill and experience may indicate. The rapid ingress of population and a summer invasion as of an army in fatigue suit, make it necessary to adopt a discipline like the sanitary police of a camp. While no place on the coast requires more of wide-awake, portable and adjustable sanitary service, we believe that it is and will be found equal to the necessity.

Long Branch, with all its sanitary delays, shows some marked improvements. While some of the large hotels have still rows of cesspools, they are kept in better condition than formerly. Still it must be claimed that this large and growing constituency has not equaled expectation in its efforts to provide a system of sewerage,

which is very much needed. The Board of Health is faithful, and with intelligent oversight will finally convince the people of the policy of more complete sanitary construction.

An important conference of shore Health Boards was held in December, at Long Branch, which showed how ready the various Boards are to co-operate in the health care of our sea-side resorts.

The series of towns stretching from Long Branch to Sandy Hook are among the most attractive along the coast. Not only is the frontage along the sea capable of great attraction, but such rides as that from Sea Bright to Red Bank, and by the main road to Long Branch, afford a picturesque variety and a beauty of landscape, and of artistic adornment, which gives new charms to all that section. Monmouth Beach and Sea Bright, and several prominent hotels between these, or nearer to Sandy Hook, are but examples of a still widening future population. The Heights of the Navesink, Atlantic Highlands, etc., add to the other an extended and charming view over the New York bay. The sail from New York City, these delightful coast views and sea fronts, and the excellent attraction of the homes and residences will ere long lead to a population of wealth, of influence and of permanency which will add much to the resources of the county and State. The time has already come when there should be a full response to plans for wide-extended improvement. A careful survey of the whole section by the Board, convinces us that it is highly politic to protect all this region from any possible nuisances, and so appreciate and protect its health interests as to secure for it that perfection of rural homestead and elegant mansion, for which it is so eminently fitted. But, unfortunately, the Upper Shrewsbury river is itself fast becoming a nuisance. It is so convenient a receptacle for sewage, and is so valued as such by each individual proprietor, that most of such seem incapable of conceiving that just the little that they pour in can do any harm. It is forgotten that the aggregate is large, and that rivers differ greatly as to their capacity of disposing of sewage. Given a river with stony or gravel bottom, of deep water, of rapid current and of wide expanse, and with speedy entrance to the sea, and the water, the air and the sunlight will work wonders in clarification and purification in the distance of a few miles. But substitute in its place a shallow, sluggish, outspread stream, where every steamboat stirs the bottom mud, where the water is just brackish enough to precipitate the sewage in part, and where an abundant

growth of some aquatic plant is able to detain within its meshes the organic matter, and you have conditions just the opposite. Indeed, you get not only results from the sewage, but the aquatic growth also undergoes its forced and unnatural changes and becomes a factor in disease.

A degraded type of malarial complication often appears with the class of fevers and ailments more directly resulting from household debris, and so there is not only confusion of diagnosis or of treatment, but the system seems unable to cope with the hybrid diversity of attack. It is true that so far but few evil consequences have been felt, although close observers who have been in that section for years, agree in noting a change. We beg to counsel those who have chosen this delightful section that they spoil not their own nests, but with an intelligent appreciation of present and future needs, they enter upon some comprehensive plan for the removal of all sewage and for a general improvement. For this the country might wisely contribute its aid so far as the river is concerned, since its own incomes therefrom would fully repay the expenditure.

It may be asked whether in defense of the general interests of the State and in the promotion of its development by inducement for those from adjacent cities to resort hither, it would not be wise to enact a law requiring all hotels and boarding-houses advertising for and receiving over a certain number of guests, to have a yearly spring examination made of their sanitary condition, for which a small consideration should be paid to the borough, town or city in which it is located. The principle of thus protecting or providing for the traveling public or transient guests, has been fully recognized in previous legislation. It is impossible for the State to provide for yearly and minute inspection of all these buildings. But what has already been revealed, both as to the great evils found and improvements made, as also the fact that all such large resorts need special supervision, would, in the opinion of this Board, fully justify the requirement of a system of skilled sanitary circumspection and certification each year. Thus all would be more fully assured and a new impulse be given to that wonderful growth which has already taken place, and which the attractions of the sea and of the various localities would render rapidly progressive.

SUMMARIES OF LOCAL BOARDS OF HEALTH.

BY THE SECRETARY.

Our correspondence this year with local Boards has been more thorough than ever before. They are becoming more informed as to their duties and as to their possibilities of usefulness. Even those that have occasion to meet rarely accept the fact of their organization, and have a better readiness to meet any sudden outbreak. Here and there a township has but little appreciation of what could be done to increase its healthfulness, and so pays for its neglect by having some extra cases of avoidable sickness.

As an introduction to the report of the year, we place a special report for Camden. Its Board of Health is imperfectly organized, and cases of death from manufactured diseases are not infrequent. The report will be found moderate in statement, exact as to facts and such as should lead to a most vigorous sanitary policy in the interests of that important and growing city. It will also be found in many respects a model for sanitary method and study in other localities.

From other reports we give various selections. Those having nothing of special interest, and not needing to be quoted from, are valuable to us as records of health conditions and as guides for sanitary suggestions. We commend this series of local reports to the careful attention of all Health Boards and Health Officers.

REPORT OF SPECIAL SANITARY INSPECTOR FOR CAMDEN, NEW JERSEY, 1884,

AS MADE TO THE NEW JERSEY STATE BOARD OF HEALTH BY ONAN B. GROSS, M.D.

In compliance with the request of the State Board of Health, I herewith present, as Sanitary Inspector, the following report:

SCHEDULE OF SUBJECTS.

A—Location, geology, topography, climate and population.
B—Streets and houses.
C—Markets and manufactories.
D—Public buildings and schools.
E—Slaughter-houses and diseases of animals.
F—Cemeteries.
G—Refuse and garbage.
H—Water-supply.
I—Drainage and sewage.
J—Public health laws and sanitary expenses.
K—Vital Statistics.
And a general summary.

A—LOCATION, GEOLOGY, TOPOGRAPHY, CLIMATE AND POPULATION.—The city of Camden is situated upon the east bank of the Delaware river, in the county of Camden. In contour it is elongated, extending north and south a distance of twenty-nine squares, east and west twelve squares, counting only the built-up portions of the city's extent. It is bounded on the north by the Delaware river and Cooper's creek, on the east by Cooper's creek and Haddon township, south by Haddon township and Newton creek, and west by the river Delaware. Its area is six and one-half square miles. Though its geological structure is slightly diversified, it in the main is represented by the sandy loam soil with underlying strata of clay and gravel.

The surface does not present any steep grades or elevations, and may be accepted as a typical, level-built city throughout, with a varying altitude from its tide-washed marshes to perhaps a mean height of twenty feet above tide-water.

The climate is mild and temperate, and in the main delightful and healthy.

The population includes representatives of nearly every nationality, but is mostly composed of the native-born element. The first four wards of this city are largely populated by a class of citizens—*i. e.*, merchants, manufacturers and mechanics—who, like the crows of West Jersey, "come home to roost," while crossing the river daily in pursuit of their callings. The number of residents of Camden who have their business interests located in Philadelphia is perceptibly increasing. The admirable system of ferriage between the two cities, and the many advantages of a residence here to such business men, is

having a marked effect upon the increase of population, especially in the better portions of the city. A fair estimate gives Camden a population of 45,000, as compared with the census returns of four years ago—41,658 (census 1880).

B—Streets and Houses.—The streets are of ample width throughout the city, with only a few scattered exceptions, and as a rule have right-angled intersections. There is such a natural and almost even grade everywhere in city limits, that grading of any consequence is required only in filling up marshy ground at certain points along the Delaware river, Cooper's creek and a large tract of meadow and marsh lands in the Eighth ward, known as Line ditch or Little Newton creek. About sixty per cent. of the building-improved streets are paved, and about fifty per cent. of the remainder are curbed and guttered. Most of the paving laid is cobble-stone, which, however, is gradually giving way to a far superior paving, *i. e.*, Belgian block, or in some cases rubble-stone. Several of the finest thoroughfares are laid with asphalt block, which is certainly a cleanly and smooth pavement, but not considered so durable as the Belgian pave.

The city ordinance relating to the cleaning of streets requires that the work should be given to the lowest bidder, who annually contracts to do the work at a cost to the city yearly of from $3,000 to $4,000; the said cleaning having reference mainly to paved streets. This work is usually done at irregular intervals by workmen with scraping hoes, who collect the dirt into heaps for removal with carts. Some of the better-paved streets are sprinkled, and the dirt collected into rows by wagon-sweepers. Brooms are occasionally used. The superintendence of this work is done by the contractor, and, by the present contractor, is done personally, which, to say the least, is a promise of good results.

The removal of ashes, garbage and slops is also a work done by contractors, who annually bid for the work at a cost usually of from $2,500 to $3,500. The collection to be made twice weekly, excepting in midsummer, when collections are made thrice weekly. The supervision of street work is a duty of the Sanitary Inspector, so far as relates to health measures, but is not rigorously enforced. (Refer to Schedule C—Refuse and Garbage.)

The houses of this city are mostly of the single family dwelling sort; but very few tenements of the multiple kind being found. The

construction material, for the most part, is brick, with occasional stone or marble fronts. An ordinance defining building within city limits prohibits the building of frame houses in the upper six wards. And another ordinance provides for the election of a building inspector, and defines his duties, which, however, requires his supervision of the material used and the mechanical construction of buildings, rather than the important work of the sanitation of new buildings, which work is not provided for by any act of city council. This is a serious oversight, and should at once be corrected. While it may be important for an inspector to see that a wall or joist has a certain dimension, it is infinitely more so to insist upon a good sewage and drainage of new buildings, for which no ordinance or enactment provides. (Refer to Schedule I—Sewage and Drainage.)

The number of buildings is now estimated at about 9,000, or one building for every five inhabitants. The increase is represented by the permits issued by the city clerk during the months of April, May and June, which number one hundred and sixty-three, which permits frequently call for the erection of a number of buildings on a single permit issued. Thus it will be seen that several hundred buildings are erected annually without the supervision of a disinterested official, so far as relates to drainage and sewage, and this matter is left to the builder and his plumber, and is too frequently a matter of dollars and cents.

C—Markets and Manufactories.—On account of the custom of selling meats, groceries and greens at small stores, there are but two market-houses in use in this city. The West Jersey Market is, in the main, a meat market, and receives its stock from a distance, with the exception of veal, of which about six calves are butchered weekly. The sanitary condition of this building is good, is under-sewered and the offal and refuse immediately removed. The Federal Street Market contains a few meat stalls, but is largely occupied by farm-produce dealers. This building is well drained and fairly cleanly.

It might be well to mention here the existence of a sealer of weights and measures, whose duties, however, do not include the work of inspection of edibles, which important work is left *undone* and entirely unprovided for. We have no inspection of edibles or milk.

The manufactories embrace woolen, worsted and ironwork mills and the making of steel pens, soaps, chemicals, paper and oil-cloths. A

few of the larger buildings, where the most workmen are employed, were inspected in order to learn their system of water-supply, drainage, etc., with the following results:

The woolen mills (300 employes) obtained drinking-water from deep-driven wells, and are well sewered. Found water in no danger of contamination.

Esterbrook Pen Factory (300 employes) was found in excellent sanitary condition and especially well ventilated. City water-supply.

Starr's Iron Works (600 employes) is supplied with drinking-water from a large magnesia-limestone spring on the premises, about 100 feet distant from any building excepting one large privy-well, at seventy-five feet, which the superintendent agreed to move seventy-five feet farther distant from the spring. Drainage satisfactory.

My attention has especially been directed to the hide, fat and tallow-rendering establishments of Baxter's, at Sixth and Kaighn avenue, and Read's, at Second and Mickle, on account of an unpleasant odor arising, during the summer especially. I found Baxter's establishment in fair sanitary condition, excepting the system of surface-drainage employed. One street bordering his place is neither paved nor guttered, and cannot drain anything upon its surface; and although this place, with its twenty-five years' existence, has been carefully managed, this objectionable feature should be remedied by draining this place into the Kaighn avenue culvert.

Read's establishment is underdrained and only objectionable on account of the odor, which seems inseparable from such a calling. "An Abattoir and its Drain," as a part of this establishment, will be referred to under Schedule E, with especial reference to its drainage.

D—Public Buildings and Schools.—Of the public buildings, there are but four requiring special notice.

The City Hall is well sewered, and stands at the head of the Benson street sewer, and on the water-shed line between Cooper's creek and the Delaware river, with an altitude of eighteen feet above tide-water line. The sanitary defects found were principally in the water-closet arrangement of the prisoners' departments. Of the twelve cells on the first floor, each 6x12 feet dimensions, all were provided with water-closets, one in each separate cell. Of the twelve water-closets, only one was found to work satisfactorily; ten were very imperfect, in having become broken, rusty or otherwise disabled, and one closet-

trap was choked, and the outflow was received upon the cell floor. All the closets were foul, and the emanating odors quite perceptible. The twelve basement cells were used principally as a lodging-room for tramps in winter; the cells contained only four or five closets that could be used at all, and they were also in a foul condition. The basement was also very damp and filthy.

The only remedy for this state of affairs in the prisoners' department, is to reduce the number of closets to a minimum and have them under the close and direct supervision of the janitor.

The Court House and County Jail occupy one and the same building. The principal sanitary defects found here have reference to the heating, ventilation, and the basement cell arrangement, water-closets and the handling of garbage. The twelve basement cells are stone-enclosed vaults, with a narrow door and grated window each, and built about five feet under ground, so arranged that one-half the number open into separate corridors, which are common receptacles for the prisoners at certain hours of the day. These corridors each contain a hydrant, bath-tub, water-closets, and a barrel-sized, galvanized garbage box, all of which were grouped at one end of each corridor. The sun rays cannot penetrate into these corridors, and the vaults are dark and damp as dungeons. At this time each cell or vault accommodates about three prisoners, or eighteen to a corridor, who, on escaping the noisome air of the cells, were obliged to breathe the gaseous emanations from the rusted and ill-working water-closet arrangement and the half-filled garbage boxes, which, while being emptied twice weekly, would have been less sour and disgusting to the smell if meantime they were furnished lids. But I think it barely possible for any plan to entirely relieve these unventilated cells and corridors of their noisome condition, excepting the one now proposed, "the removal of all prisoners from the basement to the upper floors, on the completion of the proposed new county building." The ventilation of the building is very defective, on account of its association with this basement filth. And one of the three large heaters located in this basement is lodged on a level with and between the two rows of prisoners' vaults. The air to be heated and distributed to the offices and court rooms overhead is taken directly from the corridors, and is no doubt a contributing cause of complaint made by occupants of the upper rooms of noxious odors being very perceptible on first entering their rooms in the morning. This might be obviated, to a certain

extent, by supplying this furnace, as the other two are supplied, with a box air-conductor; but this alone would not be sufficient, for the very reason that the court room and offices are too closely associated with the prisoners' apartments to be freed from their effluvia. And the proposed removal of the court and county officials to the adjoining new building is a necessity and a wise sanitary procedure, well calculated to abate this old-time nuisance of basement prisons in conjunction with public and, at times, crowded rooms overhead.

Attention was directed, by complaints, to the condition of the city's two largest halls. The first, Wildy's Hall, was found to be very defective in its water-closet arrangement, and Morgan's Hall had broken bell-traps under the streets. The promise of abatement of the respective nuisances was obtained in each of these cases.

The schools were closely inspected, and, for the sake of brevity, the result will here be given with reference only to the sanitary defects found. And as the water-supply for all the schools, excepting two in the Eighth ward, is obtained from the city reservoir, the only fact that need be mentioned in connection with this hydrant-water, is the universal use of bell-pipes to receive the waste-water, &c., which is certainly not sufficient, in the absence of the running drain-traps.

FIRST DISTRICT.—(1) *Cooper School.*—The underdrainage or sewerage is flushed by roof and yard rain-waters, and is fairly well arranged, and is deficient only in not having a small flush-tank as a protection in a dry season.

(2) *North-East School.*—Heated by steam through pipes well arranged. This school is the only one in the city thus heated, and is decidedly superior to all others. In fact, the portable heaters used in the schools are not provided with air-box conductors, and receive the air to be heated and distributed from the cellar, which, in some of the schools, is very deleterious, on account of the dampness and poorly ventilated condition of the cellar air.

The principal defect found here is the imperfect underdraining of the large privy-well in the yard, mainly on account of the drain-pipes entering the well too far above its bottom, and thus allowing a retention of from 12 to 15 inches of fœcal matter in the well at all times.

(3) *George Genge School.*—Light; ample, but not well-directed in two of the rooms.

Of the two large privy-wells in the yard, one was found partially filled with board and planking debris and very imperfectly underdrained.

SECOND DISTRICT.—(4) *E. A. Stevens' School.*—This cellar floor is not properly cemented, and objectionable on account of one of the four heaters in the cellar being a *portable*, and supplied with air directly from above the floor.

(5) *Central School.*—Heat ample, and supplied by four portable heaters; the cellar air, however, is not as objectionable as the preceding. Cellar well cemented.

THIRD DISTRICT—(6) *Richard Fetter's School.*—On account of privy-well in yard not having sewer connection, and the presence of a fœcal odor in the building mornings on opening, there is good reason for believing this drain not properly trapped. Indeed, the only evidence of any trapping of this underdrain was in the finding of bell-traps under hydrants in yard, and the traps of two water-closets in building. The rain-water conductors run into the drains and flushed them, and received the washbasin waste-water, also; each not supplied with any trapping, and it is no doubt due to this fact that the noxious odors are detected in the building. A running trap between the building and culvert is essential here, in addition to bell-trapping and S bending of all waste-water pipes.

(7) *Isaac S. Mulford School.*—Similar to Fetter's school, excepting odors in building not so easily perceived and yard not well graded. Broken bell-traps in both schools repaired during vacation.

(8) *Kaighn School.*—Light and heat sufficient; ventilation not sufficient. Odors prevalent in this building at times, owing to bad drainage. The two hydrant drains in yard were found choked. The water-closet in building not well flushed, and the drain-pipe in yard-well about one foot above its bottom. This drain needs overhauling.

FOURTH DISTRICT—(9) *Liberty School.*—Is in fair sanitary condition, and its method of underdrainage is worthy of adoption by all the other schools, especially in the construction of the yard-well, which really is the only properly-constructed privy-well in the yards of the city schools, it being a trough closet. Unfortunately, however, this drainage is run into one of the worst culvert systems in this city. *Vide* Tenth street culvert.

FIFTH DISTRICT—(10) *John W. Mickle School.*—The supply of water for this school has heretofore been taken from the dead-level of a water-pipe, but is now being corrected. A peculiar feature of the underdrainage of this building is that all drains are conducted into a large cesspool and privy-well in the back yard, which in turn is cleansed only every few years.

(11) *Central Avenue School.*—This is a small school of two rooms situated in the Eighth ward, and is quite primitive in its appointments. Light ample, though not well directed; heat, by ordinary coal stoves in each room; ventilation, by means of windows and doors only. The water-supply is taken from a pump-well in rear of building, which well is only fifteen feet distant from two privy-wells, which privies are only six feet deep, brick lined, but planted in such loose soil as to render their close proximity to the water-well very dangerous. The privies are cleansed every few years, but no method of cleansing can save the water from contamination.

SIXTH DISTRICT—(12) *Mount Vernon School.*—Light is sufficient, but not well directed. Heat obtained from two large brick heaters in cellar, is ample but is unwholesome for the reason that the heater air is obtained directly from the cellar, in which from January 1st to April 15th, this year, there was nearly two feet of water; often sufficient to put out the fires in the heaters. There are no water-closets in this building, and the two large privy-wells in the yard are underdrained into the Broadway culvert. This drain should be utilized for the drainage of the cellar of water, and it is possible nothing short of a culvert on Mount Vernon street will relieve this school of its very bad drainage, for this street is unpaved and the gutters are very filthy and offensive; and further, the culvert is now too far distant (half square) for an ordinary drain to keep the cellar dry, and run off all waste waters with the privy debris and other waters of the premises.

(13) *Ferry Avenue School.*—This school, like primitive Central avenue school, is beyond the limits of city water-supply and the culvert systems. Light good; ventilation by window and door only; heat obtained from coal stoves in each room; water is supplied from a pump-well eighteen feet deep in rear yard, about thirty-five feet distant from nearest privy-well. The water tastes very badly and is charged with visible organic debris. The odor of the water was far worse than the taste, *i. e.*, nauseous. This place is all surface-drained, and the four box-frame privy-wells in yard were in foul condition. The cellar is poorly ventilated and needed cleansing.

The ventilation of the schools, when not mentioned in above report, is by means of flues and windows. The flues have communication with rooms by means of small registers, and are not by any means reliable without the aid of some force in displacing the cold air in them by an upward current; and the best force is conceded to be

steam when steam is employed for heating purposes. There is but one school thus heated in Camden, and by its efficiency and superiority is worthy of adoption in all the other large schools.

Another ill-advised feature to be met with in our schools is the custom of rough plastering or sanding the walls of rooms and corridors. It is a means of arresting dust and dirt, and far inferior in cleanliness and purity to the smooth or whitewashed walls.

A reference to the sectional report, as just given, will show, however, that the most sanitary defects are found in the drainage of schools. A radical reconstruction in conformity with the principles of sanitary drainage is urgently needed. Here, even more important than in the drainage of private houses, are the services of a sanitary engineer, or, at least, a skilled sanitary inspector, needed in supervising the building of all drains. The importance of sanitary plumbing need not be discussed here, but the importance of supervision must be emphasized, for the double reason of insuring good work to the builder and the public, and protecting the honest and really skillful plumber from unjust and unworkmanlike competition.

The number of children of a schoolable age is thirteen thousand seven hundred and seventy (census 1884), nearly all of whom are accommodated in our schools; and some of the larger schools are capable of seating nearly one thousand pupils.

In addition to the above, the inspection included the West Jersey Orphanage (18 inmates), and the Children's Home (25 inmates), and the result was favorable in each case, excepting a large drain, in the yard of the Home, emptying into the playground of the children, contiguous to the building, all the refuse and waste-water of the building. It was at once agreed to remedy this defect, by extending the drain into a cesspool farther from the building.

E—SLAUGHTER-HOUSES AND DISEASES OF ANIMALS.—An ordinance relating to the slaughtering of animals was enacted by the city council June 3d, 1850, which prohibited the killing of cattle, sheep, swine and other animals within city limits; prohibiting, also, the depositing of entrails within city limits, punishable by fine, imprisonment, or both. The section of this ordinance relating to killing of animals is a dead-letter. I have visited and inspected eight large slaughter-houses, where killing, &c., is done without intermission, winter and summer, and in this city there are about twelve to fifteen

more where butchering is done in winter only. Of the eight inspected, five were found well under-sewered, two under-drained imperfectly, and one surface-drained into a large cesspool, which, however, is frequently cleansed. All of them were supplied with city water, excepting two; one in suburbs with pump-water, and one in city with driven-well. As to the method of the disposal of animal remains, the hides, fat, bones, &c., is sold to the tallow renderers, and the offal carted daily to the country customers, for use as hog feed or mixed in compost heaps. The summer butchering includes cattle, sheep and hogs (and in one establishment, I am loath to include, sick cows and bob-veal). An abattoir is a great city need.

The diseases of animals is a subject which receives the studious attention of the local State veterinary inspector.

Dead animals are usually carted outside of city limits and buried, or sold to the bone-boilers. The small animals are, however, the most troublesome, and dogs and cats, or chickens are frequently found upon vacant lots or alleyways, and require burial under the direction of our sanitary committee.

F—Cemeteries.—There are but two burial grounds used within city limits, *i. e.* Camden cemetery, in the Seventh ward, at a safe distance from the built-up portions of the city, and Evergreen cemetery, in the eastern section of the Eighth ward, and well isolated. There are other and smaller burial grounds connected with a few churches in the city, but are not now used for new burials, and a finely-kept ground adjoining the Camden cemetery, known as the Friends' burial ground.

Both cemeteries are well taken care of by the keepers; the graves are six to seven feet deep, excepting in the section where the city poor are buried, where a depth of four to five feet is considered sufficient. Graves are sometimes re-opened for new burials in them, but as a rule the graves are never disturbed where the occupants have died of a contagious or infectious disease.

G—Refuse and Garbage.—The disposal of house refuse is not governed by any specific ordinance, for the subject-matter is mentioned only in the general sanitary or Board of Health ordinance, wherein the refuse and garbage is prohibited by fine from being deposited on vacant lots, streets and alleyways.

It is customary, annually, for the street committee of city council to contract to the lowest bidder, the work of collecting the ashes, refuse and garbage. The contract price this year, is $2,887.50 The contract stipulations are very stringent, and require the ashes and garbage to be collected separately, and as often as twice weekly, from about September 15th to June 30th, and three times weekly during the summer season. The stipulation in regard to separate collection, is disregarded, although the contractor states his willingness to collect separately if the people will present the material in that shape, he collects as he finds them, *mixed* in the ash boxes near the curb of residences, and dumps the collection, as stipulated again by contract, either along the river front for filling up to grade, or, as now ordered, on a lot of ground owned by the city, that is bounded by Cooper's creek, Market street and the Pennsylvania railroad, within city limits, and near occupied streets. This ground is about four to five acres in extent, and is entirely under water at high-tide, and will be more fully described under Schedule I (Federal street culvert).

The slop-gatherers are a numerous class of small farmers and pig raisers in the suburbs, who, with nearly every description of vehicle from the barrow to the close box wagon, almost daily are seen on our streets collecting slops. These scavengers are not governed by any enacted rules or laws, and probably not sufficiently under control of the contractor to do their work properly, and, as a matter of course, the rejected slops are carted off in the ashes as described, but much of it finds its way to the hog-pens. Here our ordinances are again defective, and nothing short of a specific enactment can so regulate this work as to make it effective, and save our undergrade lots from a filling-up with garbage mixed with ashes.

Then, again, there are certain portions of the city never visited by the gathering carts, *i. e.*, portions of the Seventh ward, and a greater part of the Eighth ward, where the unpaved streets and undergrade lots are the recipients of ashes, and, in not a few cases, of garbage. In these portions of the city, it becomes a question of the greatest importance, "How to dispose of the refuse and garbage?" The drainage is all surface, and too frequently the undergrade lots and streets are converted into shallow cesspools by this debris.

H—WATER-SUPPLY.—The water-supply of Camden is taken directly from the river Delaware at a point about one mile north of

Cooper's creek. The river opposite the water-works is divided into two channels by Treaty island, the smaller channel being on the New Jersey side. This channel is the one from which the supply is taken, and, geographically considered, is superior to any other within a radius of ten or twelve miles. A bend in the river and the favorable location of the island favors the maintenance of the real channel on the western or Pennsylvania side of the river, which, by its accommodating the greater body of tide-water, carries with it also the heavy sewage matter received from both Philadelphia and Camden.

The maximum depth of the Jersey channel is thirty-five feet; width, half mile; length, one and one-third miles; and the only culverts that may be said to empty into the course of this channel, are the two short culverts, State street and North Second street systems, and the North Front street culvert, and Federal street *via* Cooper's creek, as the main culvert terminations. The dilution which this comparatively small amount of sewage receives may be sufficient to relieve any apprehension of danger from this source. But as the channel is a part of the river proper, the river water must receive our special investigation.

The Delaware river receives its water from such a large and diversified water-shed, that its chemical analysis is of comparatively little importance, for the very reason that it has no specific mineral or inorganic taint. The analysis of *Cooper's creek* water shows it to have some of the magnesia-limestone qualities of Schuylkill water; and as a tributary of our water-channel, the analysis by "Reuben Haines, 1884," is here given:

Lime	0.55
Magnesia	0.49
Ac. Sulph	0.64
Total Solids	3.75
Total Hardness	2.60 (Eng. Deg.) in 100,000

And the usual amount of chlorides and nitrates natural to flowing streams.

The same conclusions as to a microscopic analysis, however, cannot apply; for the very reason that the Delaware river between Camden and Philadelphia is made the common receptacle of the sewage of one million people, and the debris of many hundreds of manufactories.

During the past winter our water was unusually cloudy and dirty, and in the cleansing of the basin this spring a removal of over four

thousand cubic feet of sediment was effected by washing the bottom of the basin or reservoir. It was prior to this cleansing that the following results of microscopic analysis of our water were obtained.

The water was received directly from a hydrant, and the settlings and filterings under the microscope was found to consist mainly of ferns, micrococci, amoeba, and the many varieties of rotifera, with others not specially noted. The vegetable algæ and rhizopods were also abundant; all of which were shown to be of normal cell-color and activity. In addition to the living forms enumerated, there were found fragmentary parts of the eutomostacæ and flocculent deposits, no doubt the remains of animalcular and vegetable debris, and sand in a state of fine subdivision.

The question naturally arises, what becomes of the immense quantity of sewage and filth that is constantly thrown into the river? The natural processes of conversion, and especially oxidation, in so large a body of constantly-moving water, may, under favorable circumstances, be sufficient to render the pollution innocuous; but there are times when these processes are more or less suspended, as for instance in midwinter, when the air and sunlight are excluded by a coating of ice, or, perchance, by filth deposited too close to the receiving end of our water-pipe. Which dangers, however, are preventable by the stringent application of a better legislation than Camden has had heretofore in regard to the protection of this channel.

The water-works are well situated, and are defective only in the position of the receiving end of the water-pipe, which is almost flush with the end of the wharf, and visible at low tides.

The works are provided with two pumping-engines, one with a capacity of 5,000,000 gallons daily, and a reserve engine of 2,500,000 gallons capacity. The reservoir is of a size sufficient to contain 4,500,000 gallons. The average daily consumption of water for the year 1883 was 3,100,000.

The water-pipes leading into the city are well distributed and reach every part except portions of the Seventh ward and a greater part of the Eighth ward.

The number of dwellings and stores supplied is	7,594
Manufactories	85
Railroad depots	4
Total buildings	7,683

And it is estimated that out of a population of 45,000, 38,000 constantly use the city water, and of the remainder a large majority as constantly use well or pump-water. The number of houses not supplied with reservoir-water is about 1,300.

Before the present water-supply system was introduced, it was the custom of the then city authorities to assist the residents in building pump-wells near the curb-line of public streets, which resulted in the planting of such wells in almost every part of the city. A great many of these wells have been filled up since the introduction of the Delaware water, but there remain a full half-hundred still in constant use, and two-thirds of this number are in the upper four wards. Many of these wells should be discontinued on account of their proximity to culvert inlets. In some cases they are located on unpaved or otherwise badly-drained streets.

The parts of the Seventh and Eighth wards that are the least well drained are where the pump-well system of water-supply is mostly employed, but as the reservoir water-pipes are being gradually extended into these wards, a few facts only will be cited:

The Seventh ward east of the Camden and Atlantic Railroad is not supplied with city water, and it is the custom of the residents to plant a cucumber pump in a dug well varying in depth from twelve to twenty-five feet, in some convenient place in the yard, without a sufficient regard to the close proximity of a privy-well or surface-pool of stagnant water. In one case we found an interval of only six feet between the pump and privy-well, and many others varied the intervening distances from six feet to about fifty feet, and the users of these wells are frequently driven, after heavy rains, to borrow water from a neighbor's pump, on account of the foul odor and taste of water in their own wells. The population of this district is about six hundred.

Sycamore street, on the west of the railroad, is the only one long street not supplied with city water, but the residents here have access to hydrants on neighboring streets, only a few being obliged to use pump-water; these few pumps are no improvement over those found east of the railroad. Hog alley is a small and horribly dirty street, contiguous to Sycamore street, above Seventh, and was the starting point of the small-pox epidemic here in 1881. The streets of this district are neither paved nor graded.

The pump-well district of the Eighth ward is but a repetition of the Seventh ward, with the exception of a few localities where the

driven well has been introduced, which is far superior to the open well, from the fact that an upper strata of clay of variable thickness is pierced by the pipe before the water-vein is considered tapped. It would prove too lengthy an account to attempt a detailed description of the one hundred and fifty wells in this ward; suffice it to say, "that a depth of from twelve to forty feet, with a siding of brick or board, fairly describes one of these wells;" and a taste of water from most of them is nauseous and unwholesome to any one not accustomed to it. A few of the wells along the line ditch are very shallow, in fact, supply surface-water only. "A cucumber pump stuck in a hole in the ground," fairly describes the situation. There are a few of the old-time pumps in this district which supply a fairly good water, one of them, however, on Miller street, below Central avenue, is planted in low grade, and, after a prolonged rain, is filled by surface-water flowing into the top of the well, standing, as it then does, in a pool of water. There are about four thousand people who use pump-water in this, the pump-well district, of the Eighth ward; the city water pipes only supplying Broadway and a few contiguous streets.

In summing up briefly, it is well to note the existence of certain factors in our water-supply which, in the event of specific contagium, might render the best sanitary precautions abortive. And nothing short of a properly organized Board of Health and efficient inspectors can be relied upon for a safeguard against any threatening or existing zymotic diseases.

I—Drainage and Sewage.—The topography of Camden is favorable in the main to good drainage, when proper means are employed to effect it. The most favorable inclines for drainage are from the water-shed line, as represented in accompanying chart and marked thus × × × ×; in which directions nearly all of the street culverts are laid, with the exception of a few north and south street culverts. The water-shed line has a mean altitude of eighteen feet above tide-water, the inclines running toward the river, Cooper's creek, and line ditch; the outlet of the Tenth street culvert, as represented on the chart, however, is two and a-half feet above tide-water. The streets running north and south have favorable inclines for short distances only, and, therefore, cannot be utilized except for draining into east and west street culverts.

For convenience of description the culverts will be divided into

ten systems, and, for the sake of brevity, the principal defects alone will be described.

1st. The North Second street culvert has a length of 1,364 feet, and is defective only in having its four inlets situated at the intersections of unpaved streets.

2d. The North Front street sewer is 6,580 feet in length, and through its six-foot outlet it sewers the built-up portions of the city north of the Camden and Atlantic Railroad, and most of the water-shed line, excepting only that portion drained by the Second street culvert. Through the man-holes, near the distal ends of this culvert, where the streets were not paved, large quantities of sand were found to nearly fill the sewer's caliber, carried there through the inlets from the unpaved streets, suggesting at once the impropriety of culverting unpaved streets. In other respects this culvert is efficient, and drains a fair percentage of houses along its course.

3d. The large Cooper street culvert drains all the territory north of that street to the railroad, and east to a little beyond the water-shed line, as per chart. This sewer is the largest and best in the city, and has a length of 21,653 feet. The portion that extends north (on Front and Second streets) of this sewer is, however, too nearly on a dead level to prevent the solid debris from accumulation on the sewer bottoms, and one place particularly, at Second and Elm streets, the culvert has the appearance of gradually filling up. The only remedy in preventing the closing up of this important culvert is an extension of the Pearl street sewer into the river, which, as per chart, is now shown to extend to within one-half square of it. The rapid and valuable improvements being made in this part of the city, strongly call for this improvement. This sewer is the means of underdraining more buildings than any other in the city. One other defect may be mentioned in this system, *i. e.*, the great depth of the slip into which this culvert opens; a reference to the chart will show the extension of wharves on both sides of this slip, and at low tide about one-third of this slip-bottom is exposed to the air, which is more or less covered with sewer filth about two hours each day, in fact, until the rising of the tide. The fecal odors at low tide are very perceptible.

4th. The Arch-Federal street sewer is a most excellent one, excepting the one error of discharging the Federal street end into a large cesspool of a square's length before reaching the tide-water of Cooper's

creek. The extent of this system is 14,653 feet, and about 4,000 feet of this length is drained east on Federal street into a ditch alongside of the street, and along the border of a four-acre lot of ground owned by the city, and bounded by Pennsylvania Railroad on the north, Cooper's creek east and Federal street south. This ground is marshy and covered with water every tide, and although this ditch of a square's length is supposed to have a sufficient grade to carry off this sewer debris, it is nothing but a cesspool at its best. Each tide on rising distributes the ditch contents all over this marsh and converts it into a reeking and pestilential pest-hole. Fortunately there are but few buildings in the immediate neighborhood, but the adjoining street is a main thoroughfare and largely traveled, and the best interests of our citizens demand a correction of this, the worst sanitary defect in the city of Camden. The city owns this marsh, and it is being gradually filled up to grade with the ash collectors' debris, beginning at a point farthest from the creek and protecting the encroached-upon trench or ditch with upright planking. The sanitary condition of this neighborhood is also seriously compromised by an open gutter extending along the north side of the Amboy Railroad, and receiving in its course the surface-drainage, including sewage from the premises of about sixty houses, located near the railroad tracks. This condition is especially noticeable in the rear of California row; this row, of about a dozen houses, is the worst of the lot, and could readily be improved by draining into Federal street culvert; all alike, however, should be restricted in the custom of using this gutter for the purposes of a sewer. In all other respects the Arch-Federal street culvert system is in good condition.

5th. The Benson street system of 19,035 feet of culverting was found in excellent condition, excepting that part located on Mickle street, and from thence on Second street to the Benson street main. On account of complaints received from residents on these streets, the city surveyor and myself endeavored to make a close investigation, which resulted in locating the cause of the complaint in the culvert bend at Second and Mickle streets. The sewer was opened, and within a culvert length of thirty feet, no less than five water and gas-pipes were found to pass through the caliber of the sewer and seriously obstruct it. In fact, the sewer was nearly full of sewage and dirt, the location of these water and gas-pipes favoring the lodging of the debris at this point, sufficient, after a heavy rain, to totally obstruct

it, as was verified during the past spring, while the obstructed water was forced through the inlets and low manholes in the street above obstruction. I have examined cellars along Mickle street that bore twenty-inch water marks, and was informed that the heavier rains usually filled the cellars to that depth with water, some of it, no doubt, due to the obstructed culvert, but in part due, also, to the character of the gravel, which is made ground, and at Second and Mickle streets only two and a-half feet above high tide-water. The tide-water enters, or at least obstructs, the culvert flow, so that it is normally filled, at high tide, up Mickle street to Third. It is very evident that gas and water-pipe obstructions, under such circumstances, must prove a most serious defect. And in this instance the culvert obstruction was promptly removed. Other instances, however, of culvert obstructions of a like character have come under my notice, as, for instance, a water-pipe of six-inch dimension running through Second street sewer, between Mickle and Stephens, one of same dimensions at Third and Mickle streets, and a large gas main through a culvert near the gas works. It is very evident that our municipal laws are very defective in thus allowing willful obstructions to be placed in the culverts, and we need an ordinance, specific in its terms, relating to the laying of all gas, water and drain pipes and the building of culverts; giving the culvert the right of way in a question of grade at all times, and never allowing the tapping of a sewer or culvert, excepting by special permit.

6th. The Clinton street culvert of 14,390 feet length and five feet outlet, is in excellent working condition. It is proposed to divert 5,000 feet of the Benson culvert system to the Clinton, on account of the more favorable location of the Clinton sewer for draining this district east of Fifth street. This is a wise and practical proceeding, and is now being effected by changing the Washington street culvert grade, in order to connect at Fifth and Washington the Clinton and other street culverts east of Fifth street, in this locality. This sewer is also now being extended 400 feet towards the river wharf lines, which is a distance of about 1,000 feet from the shore, with an intervening marsh.

7th. Division street culvert system has a length of 11,775 feet. About ninety per cent. of this length is laid on east and west streets, and therefore of good grades. There is a few inches of sand found in culvert bottom, owing to some of the streets being unpaved. There

are comparatively fewer houses and privy-wells underdrained in this district than any other of the described systems.

8th. The Walnut street system is also a good east and west grade sewer, and has a length of 7,220 feet. This culvert is extended well towards the exterior wharf line, and in this respect is far superior to the Division street sewer. There are also more houses underdrained in this district, but the sewer is found in equally as good a condition.

9th. The Kaighn avenue system has a length of 6,085 feet, and is in excellent condition, excepting that part west of Second street, which is run too nearly on a dead level to be kept clear of settlings. A deposit here of about ten inches was found in a sewer caliber of four feet.

10th. The Tenth street culvert, as traced on the accompanying chart, is a large underdrain for the streets of that section of the Seventh ward. There is but one building that drains into it, *i. e.*, the Liberty school. None of the streets under which it is laid are paved, the man-holes are deeply covered with dirt, and many of the inlets are too high above the gutters to catch even the rain-fall. And well it is that this culvert is not a sewage drain, for the reason that its outlet is into an open ditch at Tenth and Kaighn avenue, which traverses line ditch for a mile before reaching the river tide-water. The altitude of this point is three and a-half feet above tide-water, and separated from it by two flood gates located between the sewer outlet and the river. The culvert ground east of the railroad is about twelve feet under grade and about one and a-half squares in extent; the undergrade ground is owned by private parties, for whose benefit the culvert was built with an open end, to favor the drainage of this section, but the ground is too low grade. As a result two large ponds of water are constantly present, and by their receiving all the surface drainage of the neighbor-hood are really converted into large cesspools, similar in some respects to the cesspool outlet of the same sewer. This culvert system includes a length of 11,092 feet, of two, three and four feet culverting, and is really under the circumstances a useless waste of material.

There are in this city three other short culvert systems: One at State street bridge of 1,290 feet; Ferry road and Jackson street, 4,415 feet, and a sewer on Jefferson street of 1,923 feet length. These sewers are in fair condition, excepting the Jackson street branch, which carries more sand than an effective sewer should, no doubt owing to the storm-water washings of the unpaved streets.

There is a total length of 128,492 feet of culverts traversing the streets, which is under the supervision of the city surveyor, so far as relates to the mechanical construction of them. In case of obstruction or inlet choking, the street supervisor is the one to apply the remedy, under the direction of the street committee of city council.

The sewer defects as recorded, are well known to our city officials, and the reason given for their non-correction is "short culvert appropriations." The city is building faster than the culverts can be laid and repaired, under the present so-called short appropriations, which, in true economical sense, should not be the case. And one of the most reprehensible defects in our system of culverts is the presence of water and gas-pipes in them, running through the sewer calibers as though obstruction were of no consequence. This is an error that a short appropriations plea will not defend, and an ordinance defining the grade lines of all pipes and culverts, giving the right of way to the sewage and drain pipes or culverts, is a necessary and essential legislative act in remedying this easily-corrected defect. On general principles an obstructed sewer or drain-pipe is worse than none at all.

In regard to house and lot drainage, we find there is no supervision provided therefor, excepting only when complaint is made to our local sanitary committee or its inspectors. The drainage of new or old buildings is entirely depending for efficiency on the owner or his plumber, and is too frequently a matter of dollars and cents. Drain-pipes are frequently laid by common laborers who do not profess to know what a drain-trap means, and I have become acquainted with a number of cases where house and privy-well drains have been laid without any trapping at all.

The necessity for a close and constant supervision of all work of this kind is so obvious that the Legislature has provided therefor in a special law applying to all cities that have Boards of Health formed under the State law, which this city has not.

The number of cases where houses and lots are badly drained is so numerous that an attempt at details will not be made, excepting two instances of lot drainage. First, of a lot bounded by Second, Washington, Third and Berkley streets, is two to three feet under grade, only excepting the street fronts. This lot is built upon on its four sides, and is travesed by very narrow alleyways (three feet); and a large percentum of the residents are in the habit of dumping their kitchen refuse in these alleyways and in the rear of their lots,

converting the middle of the square into a huge compost heap, sour, rank and very unwholesome. The sanitary committee have long endeavored to suppress this nuisance, but without success; and the reason given by one of the committee is characteristic, "No funds to proceed in the matter." (Refer to Schedule J.) Another undrained lot, at Second and Mechanic, is in a similar condition, and the sanitary committee here have wisely ordered a sewer drain, to correct this evil and run the stagnant and filthy water through it into the Kaighn avenue culvert. There are numerous lots in this section whose owners should be compelled to fill up to grade, or connect with the culvert drain.

One other important matter under this heading, is the undrained privy-wells in all parts of the city. I cannot give in full detail the number and location of such wells, and therefore will give only the system of cleansing employed. Privy-wells are as a rule declared nuisances by our sanitary committee when complained of and found overflowing or filled to within six inches of top, and are abated as such, either by owner on order, or by city at owner's expense. The ordinance rules restrict the cleaning of wells before 11 P. M. by the open method, but allows the odorless excavating apparatus to work at any time during working hours. The privy refuse is all taken beyond the city limits, and much of it used in compost heaps and manures in various ways by farmers and truckers.

J—Public Health Laws and Expenses.—The Board of Health of the city of Camden is governed by an ordinance, passed May 7th, 1872, with supplements, March 27th, 1879, and an additional ordinance on the relations of the Inspector to Board, mainly as to his clerical duties, and of no special importance.

BOARD OF HEALTH ORDINANCE.

Enacted May 7th, 1872.

[This ordinance is too lengthy to copy verbatim, since much of it has become a dead-letter, and it will, therefore, be presented in sections in as concise form as possible, and mainly for the purpose of showing its defects.]

Section 1 ordains that five members of city council shall annually be appointed by the president of city council to constitute a Board of Health.

Section 2 provides that a vacancy be filled by city council.

Section 3 ordains that the Board shall meet at such times and places as they may deem proper, and they shall keep a journal of proceedings. They shall have power and it shall be their duty—

(1). To inquire into and inspect all nuisances prejudicial to health, and abate the same in any way deemed expedient.

(2). To detain and examine any persons suspected of carrying any pestilential or infectious disease from an infected place.

(3, 4, 6). Provide for the removal of travelers or residents to hospital, when removal is necessary for the preservation of the public health.

(5). Remove or destroy all furniture that may be tainted with pestilential disease.

(7). Clean, abate or remove all nauseous, offensive or unwholesome matters detrimental to health.

(8). Persons disregarding rule 7, after due notification by the Board, are liable to a fine of fifty dollars.

Sections 4 and 5 ordain that any person who shall deposit filth of any description upon the streets, lots, etc., of the city, shall be liable to a fine of ten dollars.

Sections 6 and 7 provide for the abatal of nuisances by the city authorities at the expense of owner or occupant of such premises, when necessary, and a fine of ten dollars against any owner allowing his premises to remain a nuisance.

Section 8, the cost of abatal of nuisances by city to be collected by the city solicitor.

Sections 9, 10, 11, repealed by the ordinance supplements enacted March 27th, 1879, (to which refer in this report.)

Section 12, employment of nurses in the hospital.

Sections 13 and 14 ordain that decomposed or offensive materials shall not be landed by any ship or vessel until a permit is granted by the Board of Health, under a penalty of one hundred dollars fine. Also gives power to Board, in quarantining all vessels or people on board, in cases of suspected infection of pestilential diseases, &c.

Section 15, a suspected infectious dead body cannot be brought into city without a Board of Health permit.

Section 16, all infectious or pestilential diseases in city must be reported to Board, under penalty of ten dollars.

Sections 17 and 18 fine any person practicing inoculation of small-pox, and also person inoculated, &c.

Sections 19 and 20 relate to the necessary isolation measures to be taken by the Board in infectious diseases, and fine all persons who refuse or neglect to comply with the Board of Health's precautions.

Section 21, precautions to be taken in all contagious or infectious diseases.

Sections 22 and 23 define the duties of physicians or coroners in granting death certificates.

Section 24 not in force.

Section 25 prohibits removal of buried bodies between May 1st to October 1st, without a Board of Health permit; penalty, twenty-five dollars.

Section 26 ordains that all persons practicing midwifery, or, in case of non-attendance of such, the parents, shall report each birth return in full (monthly), or be fined five dollars for each offense.

Sections 27 and 28 prohibit any bone-boiling establishment, compost manufactory or depository of dead animals within city limits, and pronounce it unlawful for any person or persons to possess deposit places for poudrette or privy filth within city limits; penalty, one hundred dollars to two hundred and fifty dollars fine.

Section 29 fines any person for depositing sink or privy filth in any public place.

Section 30 a dead-letter section.

Section 31, any or all persons obstructing the work of the Board of Health shall be fined fifty dollars.

Section 32 provides for the recovery of all fines under this ordinance in an action for debt, &c., or an imprisonment for a term not exceeding ten days.

[Total length, thirty-two sections.]

An important supplement to the above ordinance, enacted March 27th, 1879, after defining the duties of magistrates in imposing, collecting and transfering fines to city treasurer, &c., provides in its

Section II. That the supervisor of highways shall act as inspector of the Board of Health, and his duty shall be to inspect all nuisances for report to the Board, and examine and report, within twenty-four hours, upon all complaints made to the Board, and shall serve all notices of the Board upon offending parties, and shall, at the expiration of such notices of abatal of nuisances, re-examine premises and make a second report to the Board for further action. He shall also examine all cesspools or privy-wells complained of, and, in case the

city is obliged to abate such nuisances, shall take measurements of the same for use of the Board. And he shall see that all special orders of the Board relating to street cleaning and garbage collecting are complied with, and shall receive for compensation one hundred and fifty dollars annually, to be paid out of sanitary committee appropriations.

An ordinance enacted June 12th, 1884, ordains that the inspector shall also be the clerk of the Board of Health.

According to these ordinances and supplements our Board of Health is not constituted in accord with the intent of our present State laws. The members, as appointed from city council, may be out of their element entirely as sanitarians, and the annual re-organization of the Board is but another factor of disability. The appointed members, as merchants, mechanics or manufacturers, may not be in a position to refuse an appointment upon such a Board of Health, and yet, as members of city council, they do accept such a position with good-natured acquiescence, let the result be what it may. The present Board of Health is frequently called by the chairman, Mr. Bourquin, before he obtains a quorum, and when it does meet it is, probably, for the sole purpose of indorsing the actions of its worthy chairman, who has ever taken great interest in sanitary affairs, but who is not efficiently well assisted by the entire Board, or backed by the necessary legislation to make his work effective and satisfactory.

The inspector of the present Board is street supervisor (salary, $1,000 per annum), health inspector and clerk of the Board (salary, $150 per annum), and can't be expected to be more than he is, *i. e.*, street supervisor.

The inspector's report gives the number of nuisances ordered abated as forty-eight, from June 1st to September 1st, 1884. Of this number thirty were privy-well overflows and the balance defective surface-drainage. About thirty-five nuisances were abated by owners, as ordered, and a few abated at city's expense, with about eight or nine remaining unabated.

The annual appropriations for this, the Board of Health work, is $2,000, out of which $1,600 is paid the Camden Dispensary (for medicine and medical attendance to the poor), $150 is paid to the inspector as a yearly salary, leaving a balance of $250 for the work of the sanitary committee, or Board of Health, for a whole year. This, as

might be expected, is soon exhausted, and, as a result, the contemplated sanitary work is suspended. Much of the sanitary work of the city is left undone for this very reason, and under such circumstances the Board shares the responsibility of ineffective sanitary work with the city council and its present defective and dead-letter ordinances.

There are a few sections of the Board of Health ordinance that are really worthy of adoption in a modified form, but so much of the ordinance has become obsolete that all of it may be said to have outlived its usefulness.

Camden, with its 45,000 inhabitants, may be said to have no Board of Health, as Boards are now constituted under the present State laws. Nor can it be said that there are any definite sanitary provisions or enactments that are worthy of being called health laws. A re-organization of our entire sanitary legislation is urgently needed, and if this warning be disregarded let the responsibility be placed where it belongs.

K—Vital Statistics.—Camden has been remarkably free from epidemic diseases for the past year, excepting the mild prevalence of measles, pertussis, and some scarlatina.

In examining the statistic records as kept by the city clerk, I find therein a record of reports as received, without any attempt at tabulation, and defective in the matter of birth returns.

On August 26th, the following reports were tabulated from the record books, for June, July and August:

June, 1884—	
Births	60
Deaths	87
Zymotic disease deaths	20
July, 1884—	
Births	50
Deaths	103
Zymotic disease deaths	19
August, 1884, (prior to 26th)—	
Births	5
Deaths	79
Zymotic disease deaths	10

The birth returns received in each month for registration, differ very materially from the records as quoted. Thus, in June were received seventy-three returns; July, forty-six, and August, eighty-

seven. This disparity is owing, no doubt, to the custom of physicians in sending in their reports when convenient; with some it may be once a month, others, three months, etc. And I have good reason for believing that a few are guilty of never reporting a birth.

An effort was made in June last to enlist the services of physicians and others in their making more prompt returns, by the mailing to each of a copy of the State law and a circular, which had the effect of slightly swelling the list of returns, but not by any means of making them satisfactory or complete.

Excepting the birth returns, the statistic returns are complete, and are made according to the legal statutes.

The death-rate of Camden for the three months mentioned is one in every one hundred and sixty-seven population; and the number of zymotic disease deaths as given is merely to be taken as an estimated factor, for the very reason that the death certificates in many cases merely give the immediate cause of death, thus rendering the task of learning the zymotic influences in the causation of deaths a most difficult one.

According to the given estimates, the proportion of zymotic deaths to others is as one to four in June, one to five in July, and one to seven in August. The great prevalence of zymotic diseases in Camden, with its excellent natural conditions attending a residence here, is no doubt due to defective sanitary administration.

As to the location of these reported deaths from zymotic diseases, thirty-one out of the forty-nine occurred in the four lower wards, and a large proportion occurred in that portion of the Fifth ward bordering Line ditch. This ground is much of it under grade, and numerous stagnant pools of water are found, without a possible chance of draining. And the present local Board of Health have with commendable spirit declared the necessity of abating this nuisance by the building of a culvert from this point, Second and Mechanic streets, north into the Kaighn avenue culvert.

Before closing this report, I desire to say that there is much to condemn in the sanitary condition and management of the city. I feel that this report, as the result of a prolonged inspection, loudly calls for the relief embodied in the late enactments of our State laws in regard to local Boards of Health; not only do we need the protection of such a Board, but one that is largely composed of practical sanitarians and able inspectors, organized according to the spirit and letter of approved sanitary science and administrative art.

ATLANTIC COUNTY.

HAMILTON TOWNSHIP. - *Report from* D. B. INGERSOLL, M.D.

Since July we have had a number of cases of typhoid malarial fever. I coin the name to correspond to the general symptoms of the disease. And these cases, fifteen in all, have all, with one exception, been confined to those families who have used water which analysis had shown to be remarkably pure. I may say, however, that a number of other families have used this water exclusively, and yet have escaped the sickness. The stream has been unusually low this fall, and consequently much decayed vegetable, and perhaps animal, matter have impregnated the water. These cases of fever, though generally severe, some of them were almost or quite typical cases of typhoid, were fatal only in two cases, and these the result of influences outside of the fever proper. The drainage usually gives us dry cellars. There are generally no malarial influences, except in very dry seasons.

We would respectfully suggest that the State Board recommend legislation in regard to the tenement houses, forbidding the renting or even the occupancy of them unless there be a sufficient water-supply of good water near the house. In some of our tenement houses they are compelled to drink river, or in very many cases, surface-water from wells, or to carry the water some distance from the wells of their neighbors.

And again, in regard to ventilation, many of the houses are "thrown together," and thus made "good enough to rent," and no possible means of ventilation except by doors or hoisted windows. If the windows in all cases were made to lower from the top we think the health of the inmates would be improved.

The law in regard to minors under a certain age buying tobacco has had a good effect in this township. Yet it is so lame that, as soon as its imperfections are known, it loses its force. As it now is, the parent must prosecute. Make it that any person may prosecute for selling to those under a certain age, and we may protect our youth from its baleful influences.

ATLANTIC CITY. *Report from* EDWARD A. REILEY, M.D., *Sec'y.*

Occupying a portion of the sandy island of Absecon, Atlantic City is underlaid to an unknown depth by the most recent of the tertiary

formations. Clear quartz sand mixed with the debris of modern marine shells, and laid in place by the combined action of winds and waves, is the material of the soil.

This condition has been so modified by the occupancy of about 8,000 people that the winds are no longer geological forces, and the ever-shifting sands of an uninhabited beach are here covered and held in place by houses, graveled streets, and pavements, the general level of the land being constantly raised and producing a totally different set of conditions, as viewed from the standpoint of the sanitarian.

The rainfall, which formerly passed rapidly into the sand, now no longer able to find its way through the closely-packed gravel of the streets, becomes a subject for close attention from the local Board of Health.

Happily in Atlantic City the contour of the ground is such that there is sufficient fall for an admirable system of surface-drainage at small cost, and although in some of the newer streets this system has not been fully completed, yet, taking the city as a whole, the disposal of surface-water is prompt and efficient. In the main avenues flagstone gutters are the rule, and the tendency is toward their universal adoption.

The raising of the streets and avenues to a fixed grade has made it necessary to fill private property to the same level. This important matter is in the main well attended to by property owners, although there are still a sufficient number of low lots on which rain-water stands until it slowly soaks away, to require the constant efforts of the Board of Health in remedying the evil.

Underground sewerage has not as yet been attempted, but such strenuous efforts are now being made in that direction that probably before the expiration of another year such a system will be in operation.

Meanwhile the prompt removal of refuse and excreta, as well as the dish-water and wash-water of the larger hotels, is rigidly enforced by the Board of Health.

The water-supply of Atlantic City comes partially from the mainland, nine miles distant, and as it is pumped from a pure stream draining a sparsely-inhabited area, the quality of the water is excellent.

The small amount of mineral matter contained in it necessitates the use of other material than lead for pipes, as that metal is readily dissolved in quantities dangerous to health.

Cisterns form another and excellent source of water-supply. Extra

attention is paid to their construction and cleanliness by property owners, and a section of the Sanitary Code, which is enforced, provides that no pigeons shall be allowed at large.

All markets and slaughter-houses are under the strict supervision of the Board, through their sanitary inspector, and the provisions of the code in regard to water-tight floors and general cleanliness are fully complied with.

No trades or manufactories offensive or prejudicial to the public health have as yet gained a foothold in Atlantic City, and in view of the fact that our city is essentially a health resort, public sentiment is strongly in favor of excluding such establishments from the corporation limits.

Swine, goats and geese are not allowed within the city during six months of the year, and there are no interments of human remains on the island.

The cases of contagious diseases during the year have been few. Under the instructions of the Board, the sanitary inspector, with the co-operation of the physicians in attendance, systematically quarantines every case of scarlet fever, and, after the convalescence of the patient, thoroughly disinfects the premises.

By an arrangement with the Board of School Trustees, children from any family having the disease are excluded from the schools until they are re-admitted on the certificate of the sanitary inspector, who is a medical man.

During the past year the general health of the city has been good, and during the summer months, when our population increases sevenfold, the freedom from disease has this year been remarkable.

The peculiar climatological and geological surroundings of Atlantic City doubtless have a larger share in contributing to this immunity from disease than the strictness of sanitary regulations, although we believe our Sanitary Code to be a good one, and it is in the main well executed.

BERGEN COUNTY.

MIDLAND TOWNSHIP. - - - - ——— ———.

No sewerage; a few cellars drained. Houses generally have cellars; generally used for storage of vegetables. Cesspools open bottom and sides.

PALISADE TOWNSHIP. - *Report from* D. H. VOORHIS, *Sec'y.*

The past year has been a very healthy one. There has been no epidemic of any kind whatever. Malarial fevers, which have been more or less prevalent of late years, have been less so than usual during the past year.

There has only been one complaint made to the Board of Health of this township during the year, and that was in reference to the drainage of a vacant lot. This was adjusted by the parties owning the property deepening and widening a few ditches.

There have been no cases of contagious diseases among live stock reported to this Board.

All topics in your schedule have been answered in previous reports of the Board of Health.

SADDLE RIVER TOWNSHIP. - *Report from* J. E. KIPP.

There have been no contagious diseases of animals reported to us during the past year. The assessor inquires if any losses of animals and of contagious diseases among cattle.

Malarial fever still exists. There can be no doubt that the malarial diseases prevalent in some parts of the township are largely, if not exclusively, due to the low, imperfectly-drained meadow land lying by the sides of railroads and by the side of the Saddle river, which is drained by natural drainage.

UNION TOWNSHIP. - *Report from* JACOB G. VAN RIPER, *Sec'y.*

Water-supply is from wells and springs. Water good where it is not contiguous to privies and cesspools. Western slope has soft water. The eastern slope water is hard. The Jersey City water works are in the township, for the supply of Jersey City only.

No public drainage or sewerage.

The refuse excreta is in excavated holes in the ground laid up with dry stones. When filled are emptied and mixed with ground, and sold to farmers and gardeners as a fertilizer. This undoubtedly is the cause of a greater part of what is called malaria.

The prevalent disease has been a very mild form of malaria.

BURLINGTON COUNTY.

FLORENCE TOWNSHIP. - *Report from* CHAS. A. BAKER, M.D., *Sec'y.*

Florence, the largest town in the township, situated on the banks of the Delaware; population about 1,000. A large foundry is located here, owning numerous tenement-houses, which are built in blocks, streets and alleys dividing them. These by-ways have received during the past year strict attention from our local Board, and with the gentlemanly assistance of the manager of the foundry great sanitary reform has been instituted in these places and pestilence undoubtedly stayed. The refuse and excreta from these houses is now carted away biweekly with covered carts provided for the purpose.

NEW HANOVER TOWNSHIP. - *Report from* GEORGE C. DAVIS.

Typhoid fever has been prevalent through the summer months and a part of the fall, in some localities. There is no epidemic among animals, although the hog disease is along the borders of our township.

SPRINGFIELD TOWNSHIP. - *Report from* FRANKLIN S. ZELLEY.

We have no swamps or boggy places. The land is mostly well underdrained, although there are some cases of malaria. I don't suppose there is a house in this township without a cellar, and in those cellars are stored away during the winter months apples, potatoes, turnips and cabbage and other vegetables, and for all that we are generally healthy and no epidemic prevails. The hog disease which is very bad in Pemberton township, although adjacent to us has not got over the line yet, but we fear it will. Several farmers there have lost all or nearly all their crop of hogs.

CAMDEN COUNTY.

CENTRE TOWNSHIP. - *Report from* N. BARTON, *Sec'y.*

In January and February there was an epidemic of scarlet fever in the eastern part of the township, followed, in April, by one of measles, though not so extreme as the first.

There have been more fevers, of malarial origin, this year than last.

DELAWARE TOWNSHIP. *Report from* F. E. WILLIAMS, M.D., *Sec'y.*

The drinking water-supply throughout the township comes from wells and springs. It is good soft water, with very few exceptions. Some wells have been rendered unfit for drinking by being too near barn-yards and have been abandoned.

The usual mode of getting rid of the refuse of the house is by throwing it in some low place near the kitchen door, which custom is a bad one, and is no doubt one of the causes of sickness to the inhabitants.

There have been numerous cases of infectious pneumo-enteritis among the swine in the western part of the township, one farmer losing some three hundred dollars' worth. They were put under the supervision of one of the State Veterinary Surgeons and the spread of the disease was stopped.

CAMDEN CITY. - *Report from* GEORGE VAN BENSCHOTEN.

Our water-supply is from the Delaware river, above the city; the city furnishes water; at times discolored by high floods; reservoir and pipes cleansed about every year.

All sewerage, combined system; drain to river. Two blocks back from river, in southern portion, water in cellars, and swamps below southern part of city. Brick sewers; grade low; main sewers, six feet; secondary sewers, two to three feet. High tide or below, storm and tide flushing. Ventilation by perforated man-holes. Sewerage, twenty-five miles.

Surface drainage. About one-half of cesspools drain into sewers; very few with cemented floors; emptied by carts and odorless companies.

Typhoid prevails.

GLOUCESTER TOWNSHIP. - *Report from* JOS. E. HURFF, M.D.

There is a good natural drainage throughout the whole township. The cellars are generally dry, with the exception of a few located in Spring Mills very near the pond. In these houses I learn that the cellars fill with water during stormy and wet times to the depth of several inches. There are drains running from these cellars, but they are choked up. In these houses chills have been quite prevalent this season. There are no sewers. Throughout the township the farmers

use their cellars for storing away their late crops, such as potatoes, &c., but all seem to be kept in best possible condition.

HADDON TOWNSHIP. - *Report from* J. STOKE COLES, *Sec'y.*

We have had several complaints on account of stagnant pools of water—refuse water from sinks emptying into streets through pipes—and a few hog pens. After notifying the owners thereof our request was generally complied with at once. There was one case in which we had to order the pipes plugged.

There have been several pens of hogs affected by "hog cholera" this fall, and, in most cases, they die suddenly. They have lost several hogs at the Camden County Almshouse farm lately from this cause. As soon as possible after being discovered, those that were able to be removed were driven out into a sand field for pure air, and there was no more of it; showing clearly that the disease thrives best in filth.

STOCKTON TOWNSHIP. - *Report from* DR. P. W. BEALE.

Every death, birth and marriage is reported in the township to Eli Browning, the assessor.

As for quarantine and care over contagious diseases this township should be well versed therein, as there is not a year for the last five, that we have not had cases of small-pox.

There was a single case of small-pox in the township, but through the enforcement of vaccination and quarantine we were able to prevent the further spread. The township has been unusually healthy. Malaria in its various forms has had a marked decrease. Several cases of diphtheria of a malignant type occurred, and a few cases of scarlet fever, but comparing the health of the township to that of previous years there have been comparatively few cases of serious maladies. We have had several cases of nuisance of various kinds, but have had no trouble in removing the same.

Stockton township's population is composed of a large number of colored people, and it is in close proximity to Camden and Philadelphia, and the colored people as a rule visit the slums of Philadelphia, and as the cholera is threatening, I think it proper and just to the inhabitants to exert every possible means to keep the township in a good sanitary condition, and any suggestions or information from the State Board will be thankfully received.

CAPE MAY COUNTY.

CAPE MAY CITY. - *Report from* H. A. KENNEDY, M.D., *Sec'y.*

We have been called upon to abate eleven nuisances, consisting of filthy hog-pens, cesspools and deposits of garbage.

Our water-supply is ample and good, there being no change since last report.

Sewerage system has proven satisfactory, and since last year's improvements has not needed any attention.

Our streets are thoroughly cleaned once a week, and well sprinkled every day during the summer months.

There are a number of cesspools and privy-vaults in parts of the city not accessible to the sewers. Some are cemented, others open bottom, and some merely a hole dug in the ground. These are cleaned at night by scavengers.

There has been no disease among horses or animals during the year. No registry of persons keeping horses, cows or hogs is kept.

We have no slaughter-houses or abattoirs within the city limits, but have a number of hog-pens, which become very offensive during hot summer weather. These the Board hopes to be able to remove during the summer months.

During the past year there has been no epidemic, and, with the exception of a few cases of diphtheria among the colored population during the early summer, it has been exceedingly healthy.

MIDDLE TOWNSHIP. - *Report from* STILLWELL H. TOWNSEND.

The water-supply is mostly from dug wells, although there are quite a number of driven wells, and occasionally a cistern, but not many. The water from the driven wells in most cases is excellent, but in far too many cases the water from dug wells is just calculated to produce diseases.

The past year has been one almost entirely free from any of the prevalent diseases. The Board have kept a strict watch over all cases liable to become a nuisance, but up to this time no nuisances have been reported. The hog cholera that is prevailing in some parts of the State has not reached us so far as I know. The Board will keep strict watch, and should it make a break-out, do all in its power to

prevent its spread. The question of cemeteries is one, I think, that demands attention even in this township, although so thinly housed. Houses are built and being built very closely to some of the cemeteries, and I do not see why the germs of diseases should not be drawn off in the water, and I think some speedy action should be taken in this very important matter.

UPPER TOWNSHIP. - *Report from* R. MARSHALL, M.D., *Sec'y.*

Drainage is complete and prompt, as there is a gradual slope to the river. The usual water-level secures dry cellars. In extreme wet seasons, those containing water are only exceptional. Our swamps are free from malarial emanations.

Have had no epidemics. The catarrhal diseases have been dysenteric in character but amenable to treatment. There have been a few sporadic cases of measles and scarlatina simplex.

CUMBERLAND COUNTY.

DEERFIELD TOWNSHIP. *Report from* CHAS. C. PHILLIPS, M.D.

It is proverbial that Deerfield township is the healthiest place on the globe; that no one dies until they become old. The health during the past year has been excellent; no epidemics or endemics. During the months of August and September there was a tendency to looseness of the bowels, sometimes amounting to dysenteric character, but no deaths resulted therefrom. No deaths the whole year excepting a few from old chronic causes.

FAIRFIELD TOWNSHIP. - *Report from* E. R. BATEMAN, M.D.

With the exception of three epidemics that have visited us, the year ending October 1st, 1884, has been one of general health, the sickness and mortality being not above that of previous years. During the fall of 1883 there was but little sickness; in the winter of 1883–4 we were visited by an epidemic of measles, of mild type and average intensity; no deaths. Mumps also occurred epidemically at the same time, and extended later into the spring. Pulmonary troubles prevailed to the usual extent, and during February and March a few cases of influenza, which had been epidemic the year before, were met with.

No cases of scarlet fever or diphtheria are reported. Typhoid fever moderate, and about the same as previous years. Several cases of remittent fever met with in the spring and fall, and few cases of intermittent. Tonsillitis was quite prevalent during the winter and early spring. There was an unusual amount of bowel trouble during the summer; also a widespread and thoroughly-spread epidemic of dysentery. Cases were met with of all grade, from the simple catarrhal to the truly malignant.

HOPEWELL TOWNSHIP. - *Report from* CHARLES H. DARE.

The surface of the land being undulating, there is no need of any system of drainage, as rain-water runs off, and in no portion of the township does it stand in pools after a storm. The cellars are dry, and much above the water-level.

There has been, during the late summer and early fall, a fatal epidemic of hog cholera, so called in the lower portion of this township, along the line of the Cohansey river. In one instance thirty-two hogs and pigs, out of a drove of about one hundred, have died, and in other instances a like proportion have been lost. The causes leading to the disease are to me unknown, but should be vigorously investigated.

The almshouse of the county is located in this township. Since my last report, this institution has been greatly enlarged and otherwise im proved, giving it much more room, which has been long needed. Bath-rooms with hot and cold water have been introduced. The institution is heated in all parts by steam. It will now compare favorably with any almshouse in a county of like size in the State.

LANDIS TOWNSHIP. - *Report from* E. H. FOOTE, *Sec'y.*

Houses generally have cellars, which are used to store vegetables to a considerable extent.

The slaughter-houses have engaged the attention of the Board the past summer to some extent. Wells near the pens have been closed and new ones dug not less than fifty feet from the pens. Now the question is, how to dispose of the offal, so as to banish the hogs that are fed on it, or to reduce the number to a minimum to devour the offal.

MILLVILLE. - - *Report from* T. C. WHEATON, *Sec'y.*

Water is secured from private wells. There are water-works in the city owned by a private company; very few citizens use the water from them for drinking purposes.

No sewers in the city—drainage is all surface; the main gutters are flushed weekly. Very little malaria.

Very few cesspools are cemented; they are cleaned by horse and cart, after and before certain hours of the day and night.

ESSEX COUNTY.

BLOOMFIELD TOWNSHIP. - *Report from* CHARLES H. BAILEY.

The township, by a contract made with the East Orange Water Company, has introduced water under pressure in the streets. The contract is made for ten years and is to the full limit allowed by law. Its introduction in dwellings is not very general as yet. The driven well is in general use.

Most of the cesspools are now cemented, and as the soil is a coarse gravel they do not fill fast. Most are emptied by the "Odorless Company," of Newark. In some cases, when houses are far apart the contents of the cesspool is pumped on the lawn or garden.

We have been spared from much sickness and have had no epidemics during the past year. The decrease of malarial diseases has been remarkable, and may in some measure be due to the draining and filling in of wet places secured by preceding Health Boards and the Village Improvement Society. It is proper to say that this policy has been continued by the present Board.

ORANGE. - - *Report from* THOS. W. HARVEY, M.D., *Sec'y.*

The Board of Health has little to report this year beyond routine work. There has been much less sickness than usual and no epidemics present. The usual inspections and the looking after nuisances were made more thorough than usual; our assistant inspectors were appointed for three months instead of by the day.

A committee was appointed, consisting of the Health Inspector and the City Physician, whose function is to take charge of any cases of

epidemic disease, particularly cholera or small-pox, and arrange for the proper isolation. They are further empowered to employ summary measures to stamp out and prevent the spread of these diseases on their first appearance.

When such a case occurs among the poor, where isolation is possible, it is to be enforced at once. Where removal is necessary the patient is to be taken in our own conveyance to a pest-house, the site for which we own, and which we are in position to erect on twenty-four hours notice. A disinfecting corps will be organized, which will take charge of all premises occupied by cholera patients, and who shall thoroughly disinfect the surroundings of the patients and destroy all substances that may convey the poison, as bed-clothing, body-clothing, &c.

Disinfectants are always at our headquarters, to be had for the asking.

When cases occur among the well-to-do, the Board of Health will insist on the same care in isolation and disinfection as in the other cases. We feel that in the case of Orange we can control cholera when in our midst. We only fear the danger that will arise from the many new cases that will arrive in town from outside places, and which will come to the knowledge of the Board too late to prevent conveying infection to others.

SOUTH ORANGE TOWNSHIP. *Report from* A. A. RANSOM, M.D., *Sec'y.*

Have Board of Health and all the law necessary to enforce demands. Have educated the people to take a more active interest in sanitary affairs.

Supervision of contagious diseases and vaccination confided to physician of Health Board.

Prevailing disease, lung trouble. But little, if any, intermittent since the drainage was finished in 1882.

GLOUCESTER COUNTY.

EAST GREENWICH TWP. - *Report from* ELMER BRADSHAW.

We have but little swampy ground, and seldom a case of malaria.

There are no sewers used. Cesspools are built with open bottoms, and are emptied with horse-cart and shovel.

There has been no prevalent disease among human beings. Sev horses have died with blind staggers. We cannot give the cause, do we have a cure. A number of hogs have died with (so called) cholera.

GLASSBORO TOWNSHIP. *Report from* JACOB ISZARD, M.D., *S*

The water-supply is from wells and of a good quality.

The drainage is not so very good on account of the flatness of soil. Since last year there has been a terra cotta pipe laid sev inches below the surface of the earth, to carry off the surface-w during rains or melting snows, which has improved the sanitary dition of the lower portion of our town. The length of the pi one-third of a mile, and it has cost the township about six hun dollars. It has proved very satisfactory to the inhabitants in central part of the town.

The streets and public grounds are kept in good condition.

The refuse is fed to pigs and chickens. The excreta is hauled of the town by farmers, who ask to remove it on their farms fertilizer, which is generally done in the winter time.

Slaughter-houses are built out of the town and the offal is fe swine.

The public health laws and regulations are adhered to in ca contagious diseases.

The town has had less malaria the past year than it has for n years.

GREENWICH TOWNSHIP. - - *Report from* JOHN STET

This township may be said to be thoroughly drained.

The hog cholera is raging at present, sweeping away whole leaving the farmers pigless. Precautionary measures seem to proved useless.

Careful arrangements have been carried out to prevent the accu lation of filth so as to become a nuisance and offensive to neighbo

Scarlet fever was prevalent during the winter and spring mo A few cases of diarrhœa and dysentery occurred during the sun months.

There is a marked improvement in the sanitary condition of township within the last few years by the removal of the caus diseases, as well as the abatement of nuisances, by inspection and notice.

HARRISON TOWNSHIP. - *Report by* E. E. DEGROFFT, *Sec'y.*

During the summer and fall months there has been an increase of malarial and typhoid fevers over last year, attributable, in two or three instances, to bad water-supply, and damp cellars or imperfect drainage.

Although the character of the disease has been of a lower type than formerly, the mortality has been no greater.

A hog disease has been prevailing in this township during the past few months to an alarming extent. Some persons losing as many as sixty (60) in a month.

In my opinion it is not so much the hog cholera as so many farmers think, but, in many instances, it is a true case of cerebro spinal meningitis. The symptoms are loss of appetite, high fever, vertigo, an eruption along the spine, at times bowels constipated, and, in other cases, diarrhœa, and occasionally there is hemorrhage from both nose and bowels.

We believe it to be highly contagious, and, indirectly at least, hazardous to public health, and that it should demand the immediate attention of veterinary surgery.

LOGAN TOWNSHIP. - - - *Report from* S. B. PLATT.

Surface drainage principally. The water level is such as to secure dry cellars with some few exceptions. In the past year there has been interest taken in the drainage of cellars, and where there has been water or likely to be, a system of tile drainage leading to a natural water-course has been adopted.

No sewers used; waste water generally allowed to run two or three hundred feet from well and remain on surface. Water-closets or privy wells generally situated two hundred feet from water-supply, and in many cases are not water-tight, having open sides and bottom. Are trying to correct the evil of open privy vaults and have met with some success, as all or nearly all being built are cemented on sides and at bottom.

During the past summer blind staggers among horses have been prevalent in the district and in every case fatal, there being sixteen in all. Two cases were reported as staggers, but on examination after death were found to be lung fever. No contagious or epidemic disease of cattle reported. Three cases of hog cholera were reported

in this district, all fatal, while in the adjoining district over one hu dred hogs died with the disease.

One slaughter-house in the district, and that in a very bad sanita condition.

Have adopted sanitary code under laws governing local Boards Health and circulated them through the district, which has had good effect except as to drainage of waste water, slops, and pri vaults and slaughter-houses, which we hope to succeed in the comi year without summary measures.

Vital statistics are well reported by physicians, undertake nurses, &c.

Have had some few cases of contagious diseases where it w deemed necessary to isolate them, and the instructions were general complied with. The system of vaccination is not accepted ve generally, as we have one man in the district who makes it a point denounce vaccination in every form upon all occasions.

During spring and first summer month, about thirty cases diphtheria, one case of which proved fatal. Scarlet fever prevale in winter and early spring; five cases fatal. All the fatal cases co fined to two families.

WASHINGTON TOWNSHIP. *Report from* F. W. HURFF, JR., *Sec*

This township has no system of drainage or sewerage. There portions of the township where there is considerable standing wa after heavy rainfall, and in the vicinity of this standing water cellars abound.

On the line of the township, near the Camden county almshouse, a pond of water which has caused some complaint. The head of t pond is near the house of Mr. Joseph Willits, and, as the meadow very flat, it causes stagnant water to stand, which is said to cause fe and ague and malaria. The body of the pond being in Camd county, our Board felt that they had no jurisdiction.

We have no system for removing refuse and excreta. Privies usually cleaned yearly.

The water-supply is from springs and wells.

The prevailing disease of the township during the summer has b malarial fever, but I think it has diminished from previous years. early spring we had an epidemic of measles, but with no fatal resu

Also, in the latter part of summer, we had several cases of typhoid fever of a malignant type, with few deaths.

Hog cholera appeared at Hurffville during the summer, and has spread nearly all over the township. It has proven fatal in almost every case. Some of the farmers have lost their hogs after having them fatted.

HUDSON COUNTY.

HUDSON. - - - *Report from* C. J. ROONEY, *Sec'y.*

In accordance with your request, I beg leave to present the following brief report on vital statistics, &c., of Hudson county, and cities, towns and townships thereof, for the year ending June 30th, 1884.

An outbreak of small-pox took place in Hoboken in July, 1884. The cases were few; prompt vaccination was enforced by this Board and the disease quickly disappeared.

As compared with the reports for ten years, there was a decrease in the number of deaths from croup, diarrhœal diseases, diphtheria, scarlet fever, and an increase in the mortality from typhoid fever and measles.

Consumption's rate continues high—thirty per ten thousand. This is higher than for any year but 1882, when the rate rose to thirty-two. The lowest rate was twenty-four, in 1876. I should have remarked an increase in the death-rate from pneumonia when contrasted with our ten-years average.

The whole decrease of mortality, as compared with the ten-years average, took place among children under five years old.

Jersey City's death-rate per 1,000 was $\frac{8}{10}$ below the average for ten years. In this time rates have varied from 20.3 to 27.5. There was a decrease in mortality from zymotic diseases, and an increase from consumption.

Hoboken's rate fell $6\frac{9}{10}$ below ten-years average, and was the lowest recorded in that period. There was a very marked decrease in the number of deaths from zymotic diseases; also, a decrease in the mortality from acute lung diseases.

Bayonne sustained a rate of 17.7, which was $\frac{5}{10}$ below five-years average. There was a decrease in the mortality from acute lung diseases as compared with the five-years average.

Harrison town exhibited a rate of 26.2—just up to its quinquennial average rate.

Town of Union, with a rate of 20.1, fell about 5 per 1,000 bel five-years average. There was a marked decrease in the number deaths from zymotic diseases, and a diminution of mortality from n vous diseases.

West Hoboken township had a death-rate of 19 per 1,000, whi was nearly 3 per 1,000 below five-years average. The greatest crease was among acute lung diseases.

Town of Guttenberg's rate of 27.5 was $2\frac{7}{10}$ above the average five years.

North Bergen's rate of 46.8 was 6 per 1,000 below the avera The decrease of mortality was among zymotic and acute lung diseas

Kearny township's rate of 13.5 was $\frac{7}{10}$ above the quinquenn average.

Union township's 25.4 was 1 per 1,000 above average.

Weehawken's rate, 15.7, was 10.2 below average.

Note.—On account of supplemental returns, these vary sligh from the State records.

There were more deaths from the heat in July than for the sa month of the previous six years.

With the exception of May and June, 1884, the county death-r for every month of the period now reviewed, fell, as compared w the average for seven years.

A notable feature of the reports was the decrease of Hoboken's ra in every month, as contrasted with average for ten years.

Certain additional ordinances were prepared by the counsel of t Board, John A. McGrath, Esq., at the Board's suggestion, and pas by the Board.

These ordinances are designed to provide a system of licenses a permits in the case of certain offensive trades and manufactures, a also in the case of the keeping of swine, cows, &c. They also g the Board control of the traffic carried on in emigrant-bedding fr European steamers. A registry of cattle-owners is also provided f in accordance with the suggestion made by yourself.

These ordinances seem to give promise of well fulfilling the obj of their enactment, and, to some extent, prove a source of revenue the county.

The schedules sent out from this office, in conformity with y request, are not as fully written up by the cities, towns and townsh as might be desired. Much of the information, I am informed, i well nigh impossible to obtain without much labor and expense.

A very thorough inspection of schools was made by this Board, and the result was embodied in a report to the Board of Chosen Freeholders, who ordered it printed in the various official newspapers of the county. It drew attention to many needs of the schools of a pressing character, and it is to be hoped that it will result in an improvement, where feasible.

BAYONNE CITY. - - - - - - - ——— ———.

As a general thing no cellars. Basements not occupied. City has about four and a half miles of sewers. No cesspools, or very few.

HOBOKEN. - - - - - - - ——— ———.

Water-supply from the Hackensack river, taken about four miles above the town; place called New Milford. Supply furnished under contract by the Hackensack Water Company.

NORTH BERGEN TOWNSHIP. - *Report from* CHARLES PINNELL.

Our principal supply of water is from wells and springs; a part of the inhabitants are supplied by the Hackensack Water Company, whose main passes through the township; a private corporation; our county institutions at Snake Hill are supplied by the Jersey City Water Company; the water is often discolored, water soft, bad at certain seasons of the year. The Jersey City Water Company receive sewerage above the point of supply.

As to drainage, the natural drainage of the northern part of the township was formerly by water-course emptying into Bellman creek. This water-course is the county-line between the counties of Hudson and Bergen, and has become entirely filled up. After repeated efforts to get the two counties to open the water-course, the efforts of the inhabitants of that district have entirely failed.

JERSEY CITY. - - - *Report from* GEORGE T. BOUTON.

Analysis of Passaic water made October 11th, 1884. Sample received October 3d, 1884, from office of Board of Public Works.

Taste and smell both woody.

	Parts in 100,000.	Grains per gal.
Free Ammonia	0.022	0.0129
Albuminoid Ammonia	0.027	0.0157
Oxygen required to oxidize organic matter	0.38	0.22
Nitrites	0.0002	0.00012
Chlorine (enormous amount)	2.15	1.25
Total hardness	4.2	2.45
" solids	15.05	8.76
Oxygen required (Silver)	0.62	0.36

" dissolved in one liter = 5.1 cc.
Carbonic acid " " " " = 0.8 "
Nitrogen " " " " = 14.0 "
Total gas, - - - = 19.9 "

Acid reaction equivalent to 0.49 pints Sulphuric acid per 100,000.

Note the great amount of dissolved solid matter, especially chlorid and the corresponding effect upon the hardness.

The æration is very insufficient and the oxidation of orga impurities correspondingly imperfect.

HUNTERDON COUNTY.

DELAWARE TOWNSHIP. *Report from* ASA H. HOLCOMBE, *Sec*

The general health of the township has been excellent. Malar fever of all varieties, which has prevailed in the past few years, h to a considerable extent been checked. Cases of it are not as numero the past year. The majorities of the cases being confined along t banks of the river Delaware.

There has been only one complaint against nuisance; and th was promptly attended to and abated. No general vaccination h been ordered by the Board and precaution is exercised in all cases contagious diseases.

EAST AMWELL TOWNSHIP. - - *Report from* P. C. YOUN

Measles, dysentery and a few cases of cholera morbus during t hot months of the summer have been the most prevailing diseases the township.

BOROUGH OF FRENCHTOWN. *Report from* GEO. C. LANDON, *Sec*

Cesspools are the main reliance for disposing of the kitchen wast water and slops. These cesspools are mainly holes dug in the grou

some few yards from the kitchen, into which, by means of a drain the kitchen waste-water is carried. These cesspools are usually covered, and more or less frequently emptied and purified, as the families are ignorant or well-informed upon their influence on health. Slaughter-houses are looked after whenever there is any complaint made, but not otherwise. There do not seem to be any prevalent diseases. There have been some few cases of dysentery and some cases of malaria, but hardly as prevalent as former years.

Since my last report fire-escapes have been placed on one of the large buildings, in which there are two large halls in the third story. The fire department is in about the same condition as last reported. We are still at the mercy of the fiery elements should they at any time be let loose upon us. We have practically learned but little wisdom since our last great fire.

Our cemetery is so located as not to affect the health of the surrounding country.

We are at this time getting our health ordinances and by-laws into shape, so as to conform to the late laws of the State, and hope to make our Board more efficient than heretofore.

HIGH BRIDGE TOWNSHIP. *Report from* W. C. ALPAUGH, M.D.

No. 61, High Bridge district, has a two-story frame school building situated in a low, wet place, having on the northwest the south branch of the Raritan river; on the southeast a steep declivity, covered with wood, extending within twelve feet of the house; and on the southwest the Central Railroad embankment, which is about one hundred feet high and two hundred yards from the grounds. Such surroundings make it a damp, unhealthy place. In the winter the sun does not shine on the house more than three hours in the day. The water-closets are above the well, so that the drainage is from the closets to the well, which make the water unhealthy to drink. This district employs four teachers, and has three hundred and fourteen scholars.

No. 60, Silverthorn district, has a one-story frame house, situated on high grounds and with a good drainage. It has two teachers, and one hundred and thirty-nine pupils.

No. 59, Rocky Run district, has a one-story frame house, and is situated in a low, swampy place, with very unhealthy surroundings. It employs only one teacher, and numbers sixty-one scholars.

No. 65½, Mount Grove district, has a new frame dwelling, situat on high, dry ground, good drainage and a healthy surrounding.

Our township has been quite free from contagious diseases; ve little malaria. Bronchial diseases have been quite prevalent; a fe isolated cases of typhoid fever and diphtheria.

LAMBERTVILLE. - - - *Report from* JOHN C. MOOR

No system of sewerage. Many of the cesspools are built of rou stones not cemented, the others are made by sinking hogsheads or ba rels in the ground. The liquid matter escapes in the surroundi earth, the solids mostly removed.

No new manufactories. A tomato canning factory has run refuse in the past years into the underground drain or sewer, a thence into the bed of Swan's creek (nearly dry in summer in ci limits), which is situated in a thickly-settled part of the city. Co plaint was made to the Board of the horrible stench during the ca ning season. The Board of Health filed a bill in chancery for injunction restraining the proprietor of the factory from running refuse into the sewer, &c. The injunction was granted. (Opinion Vice Chancellor Bird, filed October 17th, 1884. *Case,* Board Health of City of Lambertville v. Butterfoss.)

LEBANON TOWNSHIP. - *Report from* A. S. BANGHART, *Sec*

The past year has been healthy. No epidemics have been with until this fall, when a few cases of typhoid fever occurred in t Junction, but no cases died.

TEWKSBURY TOWNSHIP. - *Report from* O. A. FARLEY, *Sec*

In our report of last year we stated scarlet fever as being prevale the number of cases being one hundred and fifty. Within the p year there have been but few cases, numbering about ten. Malar fever is on the increase.

Three cases of typhoid dysentery occurred in the village of Mou tainville, in a family named Wise (a miller by trade), and two dea resulted. The supposed cause was traced to a spring situated near t house; said spring being so located as to receive deleterious substan that emanated from pig-pen, barn-yard, &c. The use of the spri being abandoned, no further trouble ensued in the family.

MIDDLESEX COUNTY.

MONROE TOWNSHIP. - *Report from* WM. E. PAXTON, *Sec'y.*

As to drainage: In the country districts they drain by regular drain-pipes or tile, and in our village we have large ditches in which are large drain-pipes, and from the properties that need draining, smaller pipes are run to the main or larger ditch. The most of our property is not troubled with wet or damp cellars, but where there are such they are drained as above stated. We are not troubled with chills and fever.

NEW BRUNSWICK. - *Report from* HENRY R. BALDWIN, M.D.

Many of our thoroughfares are in such sad need of repair, that during, and immediately after heavy rains or showers, they afford a lodgment for pools of water. Many of the unpaved streets are improperly drained and the ground is sodden with filth and moisture; such conditions are certainly highly insalubrious.

Our public health laws are defective. The local Boards of Health are not clothed with sufficient powers in certain quarters, and these powers can only be conferred by the municipal body. For instance our Board of Health has no power to compel connection with the sewers even where such course is manifestly for the public good, and thus far common council has failed to grant such power.

Our sanitary expenses are mostly confined to the salary of the sanitary inspector, owing to the fact that we have no superabundance of money. The people vote to appropriate five hundred dollars a year to the Board of Health, but the Board never has funds in hand to meet any emergency, since this sum of five hundred dollars is never paid into the treasury of the Board. We expend as little as possible, send all bills to the common council, and that body orders payment or not as thought proper. Comment seems unnecessary.

We are extremely happy to be able to report that the past year has been remarkably free from epidemics of any kind, and we feel confident that in this respect at least we are much to be envied by many of our sister cities throughout the State.

The tabulated report on vital statistics submitted to this Board by our careful and efficient city clerk, Mr. Edward Tindell, shows that

there were one hundred and thirty-four marriages, five hundred a forty-one births and four hundred and twenty-six deaths during t year. In this report Mr. Tindell says: "The above table is interesti as showing a greater degree of accuracy and carefulness on the part physicians and midwives in reporting statistics of births and thus co forming to the requirements of the law. Of the four hundred a twenty-six deaths, thirty-two or about thirteen per cent. occurred o side the city limits in the adjacent townships. Compared with t report of last year the death-rate is low, as here shown:

1882–1883	Marriages, 161	Births, 425	Deaths, 515.
1883–1884	Marriages, 134	Births, 541	Deaths, 426.
Decrease of	Marriages, 27	Births, 116	Deaths, 89.

This Board deems it to be its duty to call the attention of the St Board of Health to the following case of malpractice, although occu ing beyond the city limits, and therefore beyond the jurisdiction this Board. Complaint was made against one person, who attempt the treatment of a surgical case (in fact he stole it from the regu physician who was in attendance), without having a registration the office of the county clerk, in accordance with the requirements the law. An indictment was found by the grand jury, but the pub Prosecutor failed to get a verdict of guilty, as the defendant pleaded had received no compensation. Should we not have an amendme to the statute?

PERTH AMBOY. - - *Report from* CHARLES K. SEAMA

The city water-supply continues to be a subject of concern. The are very few good wells in the city, and these are in danger of becom ing contaminated as the city becomes more thickly populated. T water furnished by a private company is supplied by springs a surface-water, and is used by about one hundred and twenty priva houses. The water is soft and without any taste of iron, but is badly discolored by clay as to be unfit to use for washing purpos and few have the courage to drink it.

Strict attention is paid to incoming vessels, and all coming fro infected ports pass a rigid quarantine. There has been some scar fever and whooping cough since summer, and a few cases of dip theria. Malarial diseases have not decreased much.

MERCER COUNTY.

HAMILTON TOWNSHIP. - *Report from* WILLIAM T. YARD, *Sec'y.*

Our township has been in good health. The death-rate is one-third less than last year. We have not had any complaints from slaughter-houses. We have several in our township, but they are kept in good order. We have had the garbage from the city of Trenton stopped from being dumped on the vacant lots on State street road. The night-soil carried to one of our farms is a source of annoyance to the Board. It is hard to keep the oderless company from dumping on the farm and not covering it up. It is left on the top of the ground unless some one of the citizens reports to us, or we find it out ourselves by investigation.

The water-supply is short, it being so dry that the wells are very low, and a great many of them entirely dry.

MILLHAM TOWNSHIP. - - *Report from* JOHN J. CLANCY.

As to drainage: There is no system of drainage; there is no sewerage; there is a point between canal and creek where the cellars are usually wet; there is also a bad swamp adjoining and owned by the Pennsylvania Railroad, that is always in a very bad condition, and there is a large number of cases of malarial fever; we are never without some cases of fever at all times of the year.

This swamp mentioned in D, is, in my opinion, largely the cause of so much chills and fever; it is in the summer time in a very filthy condition; it has on its surface a thick green substance; it is, I think, an overflow from the canal.

CITY OF TRENTON. - *Report from* WILLIAM CLOKE, *Sec'y.*

During the year physicians have reported to this office the following cases of contagious diseases: Diphtheria, thirty; scarlet fever, forty; scarlatina, three; typhoid fever, four. This does not, probably, include all the cases that have occurred in the city, as some physicians, either through ignorance or neglect of the law, fail to report their cases. But it may confidently be stated that Trenton is remarkably exempt from what are known as "filth diseases." This exemption is no doubt

largely due to our exceptionally good and wholesome water-supp
This supply is drawn from the middle of the Delaware river, anc
twice filtered before it reaches the consumer. The water of the D
ware at this point is almost absolutely free from artificial pollution
there are no towns or villages or manufactories within many mile
the city that empty any waste or sewage into it. There are but v
few large towns and villages on the river between Trenton and
headwaters of the river, and but very little polluting matter tur
into it. The large volume of its flow and the ruggedness of its
and rapidity of its flow completely eliminate every vestige of s
slight impurity long before it reaches this city.

Other reasons for our exemption from filth diseases are: the top
raphy of the city, affording fine grades for the rapid carrying of
water and waste; the vigilance of the Board of Health and its faith
and indefatigable inspector; and the general and intelligent regard
our citizens to the requirements of sanitary laws and government.

During the year about one thousand privies and cesspools have b
emptied, and about five hundred other nuisances of various kinds h
been abated.

The Board made a test case before the Court of Chancery agai
persons polluting the stream known as "Petty's Run," by bring
suit against the proprietors of the American House Hotel for sewer
into said run. The case was vexatiously prolonged, but a decision
recently rendered by Vice Chancellor Bird, fully sustaining
upholding the Board. The case has been appealed to the Court
last resort, but we confidently expect a favorable issue.

The project of securing a general system of sewers for Trenton
well under way under the auspices of the sanitary committee of co
mon council. Mr. Rudolph Herring, of Philadelphia, has been e
ployed to make the surveys and prepare a plan, and this is expec
soon to be ready for submission to the common council. It is ho
to have the new system begun next spring, as soon as the weather
permit.

In view of the possible appearance of cholera next summer,
Board is adopting every possible precautionary measure.

MONMOUTH COUNTY.

ASBURY PARK. - - *Report by* HENRY MITCHELL, M.D.

An ordinance was adopted by the Commissioners of Asbury Park, June 3d, 1884, re-organizing the Borough Board of Health.

The Board has continued its routine work with little change in the general plan pursued during the previous year. House-to-house inspections, and a record of the facts in this way learned, have been the regular duty assigned to the assistant sanitary inspector, the record sheets being corrected to show the condition of each premises at each inspection. The facts gathered and recorded by the inspector are examined by the executive officer of the Board, and a memorandum is made of all cases requiring attention.

The ordinary procedure is then as follows: Notice is sent by the clerk to all persons who are found to be violating any of the provisions of the Sanitary Code. Re-inspection is made when the time named in notice has expired, and if the conditions complained of have not been remedied, the case is brought to the attention of the Board at its next meeting.

Cases of an unusual or especially dangerous character are at once referred by the executive officer to the sanitary committee, who proceed with an investigation. Suit is begun, as a rule, only upon the recommendation of this committee. The effort to get rid of leaching privy-vaults has been successful, and not one is now in use in the borough. The principal undertaking of the Board during the past year has been to abolish leaching cesspools. In this endeavor we are making satisfactory progress, there being now only a few such structures within our limits.

There are 808 dwellings in Asbury Park, and more than 700 of them are provided with suitable means for the disposal of waste liquids.

The sewers have performed their duty in a very satisfactory manner, and no difficulty has occurred in connection with them during the year.

Time seems to be showing that with our system, and in this location, no practical objection exists to casting sewage into the sea.

There are one or two features connected with the sewer system in Asbury Park, which may be here briefly referred to. 1st. All of the sewage is strained by passing it through gratings having three-quar-

ter inch openings. This was undertaken to prevent discharg paper and other material which might be visible and objection when it reached the ocean. The gratings are placed on each pr ises connected with the sewer. In cases where water-closets are u a catch-basin is inserted in the course of the house-drain, and pl as near the house as is practicable. The trap on the house-drai placed on the sewer side of the catch-basin, and the grating is pl over outlet from catch-basin. The cover of the catch-basin is hi and perforated, and serves as the cold air inlet for the soil-pipe. Automatic mechanical ventilation has been secured for the recei vault on the beach. This has been accomplished by connecting twelve-inch discharge-pipe with the top of the vault by a bra When the gate guarding the outflow of sewage is closed, the sea tinually rushes into and flows out of the twelve-inch pipe; and be the branch connecting this pipe with the top of the vault was in duced, a water-hammer was formed against the gate. By venting twelve-inch pipe a few feet from the gates, the water-hammer prevented, and by conducting the vent into the receiving vault its top, a puff of air is sent into the vault by each succeeding w and, in turn, a puff is sent out of the ventilator connected with vault, thus securing continuous stirring of the air in the vault. streets of the borough have been kept in admirable condition, during the past summer the dust nuisance has been overcome thorough street sprinkling.

The artesian well which was sunk last year in this borough, tinues to flow without diminution, and the quality of the w remains unchanged and is excellent.

Another well is now being bored at the corner of Kingsley st and Asbury avenue.

During the past year gas has been introduced into the borough, it has not yet come into general use.

Garbage is carted away by the public carts, daily during the s mer, and twice each week during the winter. Rubbish is also ca away at public expense. Excreta is mainly disposed of by mean the sewers. Licensed scavengers excavate privy-pits when necess and cart the night-soil several miles back into the country, where composted for use as a fertilizer.

There are no slaughter-houses in the borough.

Livery-stables and fish-markets have proved to be the most ob tionable business places with which we have to deal.

No disease has been prevalent in this district during the past year. We have not had a case of typhoid fever, diphtheria or small-pox during the year, and no death from any zymotic disease has occurred. We have found authority in the laws now on the statute books for nearly all measures necessary to effectually carry on the work of health protection, but wish to call attention to two needed additions to the laws now in force. 1st. Provision should be made for the creation of health inspectors and assistant health inspectors, and definite authority should be given local Boards of Health to order inspections of private property. 2d. There should be authority for the making of ordinances which will provide for the ventilation of privies, cesspools and other stationary receptacles for filth.

EATONTOWN. - - - *Report from* E. W. CRATER, M.D.

Water-supply mainly from Shrewsbury river and small branches fed from the ocean, and all subject to tide fluctuations.

Refuse allowed generally to take care of itself. Closets cleaned occasionally, at owner's expense.

Scattering cases of dysentery, intermittent and remittent fevers.

FREEHOLD TOWNSHIP. - *Report from* W. J. MCCLURE, *Sec'y.*

So far as healthfulness is concerned, we have been exempt from contagious diseases; an occasional case of scarlet fever or measles, which has yielded to prompt treatment, and no epidemics have prevailed.

We are without any system of drainage, and recourse is had to cesspools, many of which are improperly constructed and prove to be nuisances; many privy vaults are in like condition, but we hope by due persuasion to have the evils remedied. Some of these cases have been complained of, and, after due notice from the Board and knowledge of the law, the nuisance has been abated.

Our Board had occasion to visit the jail in July, which was found to be in a very unsanitary condition. Notice served upon the county board of freeholders had the desired effect, and the premises have undergone a complete overhauling; the cells and interior have been thoroughly cleansed, painted and white-washed. Our Board is of the opinion that the present accommodations, (there being only one water-closet and one bath-tub) is inadequate for the number of per-

sons in confinement, there being at the time of the visit more t thirty persons, and latterly the number has increased to over fifty.

A large cesspool in the yard in the rear of the jail, receives all liquid and solid matter, which is conveyed away frequently in a ti box wagon, but from the rapid accumulation it occasionally beco offensive. There is no ventilation except from the top (man-ho and the Board has advised the running of a pipe to a point above jail of sufficient size to carry off the gases.

Another matter which we have not as yet been able to remedy the fouling of a water-course which occasionally becomes offen from accumulations, stagnant water and slops from house drains.

We have not as yet published any ordinances, but before anot season expect to take such measures as will insure our town aga sickness or anything that may seem objectionable, so far as is possi

A matter that calls for special attention is the hog-pen nuisa and we have on hand your printed letter to F. H. Lum, Chath which we consider applicable to our case.

LONG BRANCH. - - *Report from* E. B. BLAISDELL, S

Extra precautionary measures have been taken to put Long Bra in the best sanitary condition possible, in view of the possible vis tion of contagious diseases, or the advent of Asiatic cholera in spring. The Long Branch brook has been cleaned out from its mo to its source, involving a large expenditure of money. This wa judicious movement, as the brook was obstructed by branches of tr and in some cases, despite the vigilance of the inspector, had bec the dumping-place of much rubbish, vegetable and organic matter

During the fall $125 was paid to Mr. George Waring, a civil e neer of Newport, R. I., for a report, to be submitted in writing, system of sewerage—the thing so long needed by this place. hoped before spring it will bear some practical results. If effecte will conduce much to the sanitary condition of Long Branch.

Application has also been made to the city council, who refu any appropriation to the Health Board, to have the main st macadamized, that surface-water may run off and thus prevent accumulation of debris and mud-holes in the main thoroughfare of city.

The Board has been untiring in its efforts to abate all nuisan

and where complaints have been made the sanitary inspector has been diligent in the performance of his duties.

The president, S. H. Hunt, has devoted much time and labor to interest the citizens in the project of sewerage, and many of the non-residents have signified their interest in the movement by organizing a company for the purpose of effecting that which now seems impossible, owing to the opposition to bonding the city or incurring further debts.

MATAWAN TOWNSHIP. - *Report from* BENJ. GRIGGS, *Sec'y.*

There has been erected on the outskirts of the village a soap manufactory, also used for the manufacture of fertilizers from the carcasses of dead horses and other animals, the smell from which has been exceedingly offensive. Complaint was made by persons living in the vicinity, and the Board of Health visited the premises and advised the proprietor to desist the operation, which he promised to do or remedy the evil. Since then complaint has been made before the grand jury of the county, and an indictment as a nuisance obtained, which case is now before the county courts.

There has been more malarial fever in the last six or eight months than we have had for two years past, but mostly in a mild form; otherwise our vicinity has been quite healthy.

OCEAN GROVE. - *Report from* Rev. A. E. BALLARD, *Sec'y.*

The water-supply is still mostly derived from driven wells, and, so far as we can tell, remains uncorrupted. There have been a few cases where it has been suspected that the nearness of cesspools for waste-water has affected injuriously the wells near them. The location of wells or pools in every such instance has been changed.

The water from the artesian well has not diminished in its flow or changed in its purity. It still sends to the surface its fifty gallons each minute. The pipes by which it is conveyed through the Grove were saturated with coal-tar in their preparation and the water tasted of the tar. For this reason it has not been introduced generally. Several of the large hotels and a few of the smaller houses take their culinary and drinking-water from it, and as the tarry taste is disappearing, many more people are expecting to arrange for its use. It is never discolored, has no iron taste, is soft, it is not bad at any season

of the year; its pipes are cleansed by free flushing at suitable interv
and discharging into the sea.

The question of receptacles for water-waste is receiving increa
attention. The larger houses have been induced to abandon the ce
pools and substitute sewer connections for both pools and privy vau
But the smaller ones, where there are but few occupants, and are o
used during a part of the summer, mostly decline the expense of se
connections, and the cesspool seems to be the only method left. T
the danger of water-pollution from this source is continually incre
ing is accepted as a fact, and anxious consideration is being given
the subject. Large cemented vaults for the storage of water-waste
costly in construction and embarrassing in discharging, but as yet
the transition from the system where it percolates into the grou
from uncemented vaults. There does not appear to be anything bet
at the present for this class of houses. The true remedy which m
eventually be adopted by all, is connecting with the sewer.

There has been a gratifying increase in these connections during
year just past. Ninety-two new places have been added to the l
making altogether at the present time, two hundred and four conn
tions. The extent of pipe already laid is over seven miles. They
cleaned at suitable intervals with water from the lakes forced i
them by our steam engine. This grade is regular, on a fall of o
twenty feet to one-third of a mile, and at the sea the outlet is b
rapid and continuous. Up to this time there has never been
obstruction, and there is no perceptible odor or discoloration of
water for a distance of over three to five feet from its discharge. T
taredo worm last fall destroyed the trunk by which the sewage
carried out into the sea, and which had cost us to lay, over four th
sand dollars. It has been replaced by a system of galvanized wrou
iron pipes bolted to pilings, devised by D. H. Brown, Esq., treasu
and which appears to work perfectly.

From the pipes through which it is drawn the water from
driven-wells sometimes tastes of iron, and in some cases discolors
tea or coffee made from it.

Except in a small area located in the southern part of the groun
the cellars are dry. In these exceptional parts they are cemented.

There are now no swamps near to us. The upper part of Fletc
Lake has been excavated to a clear gravel bottom, and its sides fil
in with gravel. That portion lying outside, between the turnpike

railroad, has been filled in from three to five feet in depth with the best material obtained from Elberon, except a few feet, which is now being done under the supervision of the association. The utmost care has been taken to provide for drainage of surface-water into the lake below, and the free flow of the stream above the railway track. Extra large iron pipes have been laid for this purpose and carry all the flow.

The work is pronounced by competent engineers to be of great sanitary value to all the surrounding territory. Upon this property a railroad depot is to be constructed, whose cemented privy vaults will either connect with the Asbury Park sewer, or whose contents will be removed in accordance with the rules of the Board.

The streets have surface-drainage into the sea. The camp grounds are raked over daily and the rubbish carted away.

The parks and other public grounds are frequently subjected to the same process.

The streets are rounded in the center and the surface collections are removed as often as the needs of sanitation or comfort require.

Decaying matter left carelessly upon the ground around dwellings, obstructed cesspools, waste-water thrown upon the surface, rubbish upon vacant lots, garbage missed by collectors, have required incessant oversight, but in no known case have the offensive conditions been allowed to remain.

An official inspection of all the houses in the Grove was made during the past winter, by the secretary and assistants. Defective conditions were remedied by the secretary. The good effects have been felt for the whole of the past summer.

Kerosene is generally used by the people for artificial light, and the streets and shore are lighted with it. Up to this time no serious accident has occurred from its use.

The auditorium uses a gas made from iron combined with chemicals, which has given general satisfaction. A proposition to introduce gas into the Grove through iron mains has been seriously considered.

From about the middle of June to the middle of September the garbage is collected daily, and removed to a distance of over two miles. In the cooler months the removals are made semi-weekly or tri-weekly, as may be needed. Cesspools and privy vaults are cleaned, when necessary, by an excavator at any part of the season, and the contents carried the distance named above and buried. The thick matter which accumulates in these during the season is taken out in

the winter and either composted with muck and lime or buried w
the rest.

The sanitary arrangements for tents elsewhere are on the basi
those required of cottages, which demand full provision for wa
cesspools and privy vaults.

The houses are all annually inspected with reference to th
arrangements for fire, and special attention is given in oversigh
the construction of flues while they are building; outside iron f
escapes are required on all large buildings.

The cemetery is nearly two miles from the Grove, situated upo
high elevation, and the burials are conducted in harmony with
advice of the State Board.

There has been a general compliance with the ordinances of
Board of Health, in the rules and regulations. The general regis
tion and vital statistics are attended to by the officers of the townsl

Contagious diseases are reported to the secretary, and a perso
quarantine established over them by the secretary in connection w
the advice of the attending physician and the regulations of the S
Board. There have been four cases of mild scarlatina reported, al
which recovered speedily. Two of typhoid fever, with one de
cause unknown.

The sanitary expenses in sewer outlet, the reconstruction of c
modes, the removal of garbage, salary of secretary and policem
and incidentals, have been large, but have all been met by the Oc
Grove Association, and do not appear on the books of the Board.

In all general matters the secretary has been guided by the p
lished rules of the State Board. In special cases he has endeavo
to obtain the advice of its secretary, which has always been fre
given.

In the execution of its ordinances the Board has sometimes b
compelled to intrude upon privacy and exercise arbitrary power.
has been so sustained by the officers of the Association as to make
work practicable, and in most cases the people have been willing
co-operate with the Board in the arrangements deemed necessary
the public good.

SHREWSBURY TOWNSHIP. - *Report from* RICHARD A. SICKI

The water-supply is from wells, and generally good, except in
thickly-settled parts of the township, where in many cases the wa

is getting very poor. In the town of Red Bank, containing a population of nearly four thousand, the supply now is entirely from wells, and the water from them is very much contaminated with foreign matter or soakage. The commissioners of the town have made a contract for the erection of water works to supply and be owned by the town. It is to consist of a well fifteen feet in diameter, sixty-four feet deep, to reach the water-bearing sand below the marl, the water to be pumped from the well into a reservoir situated on a hill about one and a half miles distant, the water being forced from the well to the reservoir on the hill by large-sized pumps. The pipes connecting the two are laid. Hydrants for fire and street purposes are stationed at intervals along the main, and connecting pipes to be laid in all the streets in the corporation. The well at the present time is down fifty-six feet, and the water is coming in freely, to the extent of about two hundred thousand gallons per day. Three experimental pipe-wells were sunk to determine the exact depth of the water-bearing sand below the lower marl bed, where the State Geologist was confident an abundant supply of pure water under pressure existed. These experiments prove the correctness of the theory, and at a depth of sixty-three to sixty-seven feet the water rose to within ten feet of the surface. Pumping freely from the pipes showed the supply to be practically inexhaustible. Samples of the water were analyzed by the State Geologist, Prof. G. H. Cook, who reported it pure and soft, unexceptionable for laundry purposes, steam boilers and family use. It is expected that the water works upon the plan adopted will be completed by the beginning of the year.

In all other respects I believe the condition of the township is the same as the report made last year.

MORRIS COUNTY.

CHATHAM TOWNSHIP. - *Report from* I. A. DE HART, M.D.

Complaint was made to this Board of a butcher both as to his slaughter-house and a pig-pen containing twelve pigs, adjoining the slaughter-house, into which all the offal and other refuse was thrown. Notice was served upon him to remove them, and as he did not do so, after waiting a reasonable time the counsel of the Board was instructed to notify him that legal proceedings would be commenced against him at once if he did not comply with the notice sent him.

Numerous other complaints numbering twenty-five have been m to the Board from time to time of overflowing cesspools and priv foul pig-pens and cisterns. In every case where complaint has b made, an investigation followed by the president and health ph cian. When nuisance was found to exist, the owner thereof was d notified to abate said nuisance, and there has been cheerful complia

Several cases of scarlet fever occurred early in the summer, fi which there were but three deaths. The second week in Septemb case of diphtheria developed in a child that was visiting one the families where scarlet fever had previously existed. Four d after the development one of the children of this family was ta ill with it and died with diphtheritic croup. Four other child in the same family also had it, and one of them died after th days' illness. The father has since been very ill with it, but recove Three other families, whose children were likewise exposed to disease by playing with the first child while it had a sore throat, were not thought ill enough to call a physician, also had the diphthe One of these families also had the scarlet fever and lived in the rea the first family that had diphtheria. There were twelve cases in f families and four deaths. These were all children except one ad who recovered. Since then there have been three cases, one child two adults. One of the latter, a lady who assisted in the care of of the children that died, was taken suddenly ill with diphtheria died after four days' illness and six days after exposure. The ph cians attending these families reported the cases to the Board, and immediate inspection of all the premises where the disease exis and also of the adjacent premises, was made by the president and he physician. A bad sanitary condition was found in all the premi The yard in the year of the residence of the first family attacked, c tained two cisterns nearly filled with impure water, and a large pr which received all the waste-water from the sink. This privy o flowed after a heavy rain-fall and ran into an adjoining yard. B of the cisterns were thorougly cleaned and a new privy vault was bu perfectly water-tight. The owner of the premises would not allo nuisance to exist on his property at all, if informed of the fact.

The yard of the second family was surrounded by several nuisan consisting of three privies, all of which required immediate attenti and within six feet of the rear of the house was a pig-pen. The pare said that the stench from the pig-pen was so fearful during the wa

ier that the windows and doors were kept closed, and frequently were made sick by going out of the back door and inhaling the Nevertheless they endured this after both of their children had t fever, and now both have had diphtheria. Another pig-pen also across the street, and directly opposite this house which has just complained of. The third family had a very foul cistern under itchen and a privy within twenty-five feet from the back door. e rear of the fourth family the yard contained three privies, neath which were shallow pits to receive the material, and all of were overflowing. Notices were served on the owners of all remises inspected to have the nuisances abated immediately and nost cheerfully complied.

ing to the rapid development of diphtheria, it was thought best e both the public and Catholic schools for a short period, as of the children attending the schools were obliged to pass gh the infected district in going to and returning from school.

re have been about twenty-five complaints of nuisances made to oard since June 15th, and all have received due attention and bated as speedily as possible, except one, which it was thought require legal proceedings to compel the owner to comply with dinance and abate the nuisance; but when he found that the l of the Board was about to commence proceedings, he con- to abate it.

larial fevers have not prevailed as frequently in our midst during st spring and summer as formerly, and where they have devel- t has been mostly in persons who have previously been afflicted hem. Owing to our high altitude we should be entirely free malaria. The supply of good water for culinary and drinking ses in the township of Chatham, and especially in the village of on, is very deficient.

re are but few wells, and many families depend upon unfiltered -water, while some have cisterns with a filtering apparatus. are numerous springs in some parts of the township, and espe- in the village of Madison.

ny houses have no sewers or cesspools, but allow the waste-water into the garden or street gutters by means of small drain-pipe. have cemented cesspools, which are emptied by means of pumps, others have cesspools with cemented bottoms and sides laid with ate layers of brick, thus allowing their contents to be absorbed

by the earth. An odorless apparatus has been in use in an adjoi town for the past year, and has been used in our village for empt cesspools with very good results.

There are two large cemeteries in our township, Hillside and C olic, and a small cemetery where a few families bury.

Our secretary, who is township assessor, keeps a record of vital tistics.

During the prevalence of diphtheria the laws of 1883, relatin public funerals of those who die with contagious diseases, were lished in our weekly paper so that all might be informed of existence.

HANOVER TOWNSHIP. - *Report from* G. A. BECKER, M

There have been a few mild cases of scarlatina, with one fatal during this year. Malarial diseases have been on an increase, probably, to the wet season followed by the drouth. The sout portion of the township is low meadow land, and after heavy rai protracted wet spells is nearly all under water, and then, when a dry spell succeeds the wet spell, there is a great deal of decompo vegetable matter.

PEQUANNOCK TOWNSHIP. - *Report from* E. W. MARTIN, S

There has been no contagious disease among us. The subje vaccination has been attended to.

WASHINGTON TOWNSHIP. - *Report from* E. C. WILLET, S

The supply of water in this township is mostly springs, and drainage of the township as a general thing is natural.

We have but one slaughter-house in the township. There has no complaint against it. It is kept in better condition than form

Our school-houses through the township are in good order well ventilated.

There has been no prevailing epidemic this year. Malaria we had to some extent; some few cases of dysentery; pneumonia, bu cases.

RISTOWN. - - *Report from* CHAS. H. GREEN, *Clerk.*

ur water-supply is from springs; furnished by the Morris Aque- Company. Streets are kept very clean and in good order; the ipal streets are macadamized. Cesspool system. No sewers. fuse is deposited on public dumping ground, buried in trenches. vo burying grounds in city, but seldom used; two cemeteries out y limits.

arantine when necessary, and contagious diseases looked after by h physician. Expenses about eight hundred dollars.

OCEAN COUNTY.

EY TOWNSHIP. - *Report from* FRANKLIN MATHEWS, *Sec'y.*

ell-water is used. Cellars wet, contain water often. No malaria. school-houses, in good condition. Vaccination not well kept up. monia and typhoid fever.

PASSAIC COUNTY.

CHESTER TOWNSHIP. *Report from* JOHN H. VAN HOUTEN.

sewers in the township. Cesspools, where used, are generally open bottoms and sides, and are emptied by having contents out by buckets. If slops and water, these leach through the nd, and then, what remains, is shoveled out and taken to the re or compost heap.

OF PASSAIC. - - *Report from* F. H. RICE, M.D.

e health of the city has been unusually good for the past year. pidemic or prevalent disease has invaded the city. Malaria ases year by year. The old arrangements for the water-closets prevail, but are growing less popular. The water-supply comes the Passaic river, but for drinking purposes cisterns and driven are mostly used. The Board have called the attention of the council to the necessity of having a system of sewerage at once. have taken initiatory steps to secure the same. So, by another we hope to have the city sewered, or some part of it at least.

PATERSON. - - *Report from* WILLIAM K. NEWTON, M

In our report for the year ending October 1st, 1883, we outl the facts relating to items A, B, C, D, H, K, R, S, T and U in schedule.

Under water-supply we would add to last year's report by sta that we have availed ourselves of the provisions of the supplemen health law of 1884, and have passed an ordinance relating to water-supply. Each well in the city is being examined, and water thereof analyzed by the health officer. Eleven public and t private wells have been ordered closed or unused.

One mile of new sewers has been completed this year. U authority given by the Board of Aldermen, we have ordered t hundred and forty-eight houses connected with the public sew where such connections did not exist.

A form for the sanitary survey of a house has been prepared, we shall be able to report in a year after the statistics shall have tabulated.

We have made but little headway in methods of disposing of ho waste. Two odorless companies now do all the work of remo night soil, all other methods being prohibited.

A thorough inspection of our schools is to be made this winter.

The system outlined in our last report has been followed out to satisfaction. During the year embraced in this report five hun and forty-seven nuisances have been abated. Prosecutions before recorder have been rare, and penalties not to exceed forty dollar all have been imposed.

The clerk of the board of aldermen is, by virtue of his office, ister of vital statistics, and not being a physician, and taking no int in the subjects, vital facts of great value are not used. The boar aldermen has been petitioned to assign this work to this Board, for political reasons have so far refused to act. In the meantime ures of extreme value to us in the study of the sanitary conditio the city go for naught. We hope for a change in the future. •

The plan noted in the report for 1883 has been followed out partial success. The following cases of contagious diseases have under our care:

DIPHTHERIA.

		Cases.	Deaths.
1883.	October	9	5
	November	12	6
	December	15	6
1884.	January	24	6
	February	8	2
	March	11	8
	April	9	–
	May	2	–
	June	1	–
	July	2	–
	August	2	1
	September	3	–
	Total	98	29

Percentage of deaths to cases, 29.59 per cent.

SCARLET FEVER.

		Cases.	Deaths.
1883.	October	41	6
	November	69	9
	December	73	7
1884.	January	58	4
	February	22	5
	March	45	3
	April	15	2
	May	37	3
	June	34	–
	July	40	6
	August	26	2
	September	18	1
	Total	478	48

Percentage of deaths to cases, 10.04 per cent.

cases of small-pox are noted. It is conceded that the reports of of diphtheria and scarlet fever are pretty full, very few cases ng notice.

city government appropriated three thousand six hundred dollars e uses of this Board for the fiscal year ending March 20th, 1885.

NE TOWNSHIP. - *Report from* RICHARD J. BANTA, *Sec'y.*

drainage of lands in the western part of the township is needed adly, and the people begin to see the advantage they would de- rom it. Some have already commenced, and I think others will .

SALEM COUNTY.

LOWER ALLOWAYS CREEK. *Report from* W. WINFIELD PATRI

Dysentery and malarial diseases have been prevalent, also mea and mumps.

The losses of animals have been small, and have had no contagi diseases.

LOWER PENNS NECK. - - *Report from* SAMUEL LECR

No disease of animals except a few cattle that have died in meadows a few weeks ago.

We have had this year typhoid fever, some malaria, fever and ag

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QUINTON TOWNSHIP. - - - *Report from* G. A. AYA

Public health laws and regulations receive careful attention fi Dr. A. G. McPherson, member of local Board of Health.

Sanitary expenses, total up to date, $16.

No special diseases, but all slightly tinctured with malaria.

CITY OF SALEM. - - *Report from* WILLIAM T. HILLIA

In presenting this our second annual report, we feel there is ca for congratulation that the health of our city has been generally go no epidemic or contagious disease having prevailed to any consid able extent during the year.

As stated in our last report the public water-supply is from Lau run. The works are owned and conducted by the city, the wa being conveyed through cast-iron pipes a distance of three and a h or four miles. The quality of the water continues to be unsatisf tory, so that it is used for drinking and culinary purposes only t very limited extent, except in winter. The water of the run w it enters the pond is pure and the quality good, but the bottom of pond being swamp, mud or turf, causes a considerable discoloration the water, and imparts to it a disagreeable taste. It has been int duced into about two hundred and five premises. The water of wells, as previously mentioned, is quite hard, with a slightly unple ant taste to those unaccustomed to it, but is believed to be entir

lesome. One of the ordinances which the Board have under con-
ation, restricts the placing of privies too near wells, though in
cases the depth of the lots has allowed of their being placed at
e distance.

he excessive rains of last February and March caused many
rs to have water in them which had been exempt for more than
ty years, it being an unusual circumstance, since our streets were
ed and the gutters paved, for our citizens to be thus incon-
enced. The bank meadows, which are contiguous to the city, are
drained, and malarial diseases have not, it is believed, been more
ent here than in other places. We have no public sewers, except
short ones to convey the gutter water across the street, and a
distance away. One of these claimed our attention during the
ner, but has since been repaired and partially rebuilt under the
tion of a committee of the city council.

intimated above, the city is without any regular system of
ic sewers, but private sewers or drain pipes are in many cases
to convey the contents of indoor water-closets and kitchen slops
servoirs or cesspools, which have heretofore been constructed in
articular or prescribed manner, and but very seldom with cemented
m and sides. This is another subject concerning which an
ance is now pending. It might be mentioned that the two
eries located in the city, where ice cream is largely manufactured,
der to avoid annoyance to the public, convey their waste-water
derground pipes a considerable distance.

e condition of the slaughter-houses, and what disposition to
of them, has claimed much of our attention, particularly during
ummer months. The owners have exercised increased care in
d to them since this Board has had them under its supervision,
t seems to have become almost a positive fact that the health and
ort of those living in their neighborhood demand that they
ld be removed outside of the city limits. Some recommend their
located on the creek, so the blood and offal which are now con-
d and manipulated by swine, might be discharged into it; but,
ing a tide-water stream, the animal matter so emptied into it
t, by the action of the tide, be prevented for some time from
ng very far down the stream, and so become a cause of
yance.

new manufactories have been built which would be likely to

affect the public health. The four canning factories are all locat near the creek, so their refuse can be discharged into it, which h been done with one exception, and in that case this Board have notifi the owners of the necessity of making a change before another ca ning season.

We have had under our consideration a code of ordinances relati to the public health. Our city not being compactly built, and co taining only between five and six thousand inhabitants, requires fev ordinances of this character than larger and more populous citi but we feel the importance of having certain regulations on t subject.

In our last report it was mentioned the board of chosen fr holders were considering the expediency of building a pest-house the accommodation of persons afflicted with contagious diseases, b we regret to say the opposition to it was so great in some quarters was given up. Though we have had no cases of smallpox during t year, yet our past experience induces the belief that something of t kind would be very useful.

SOMERSET COUNTY.

BEDMINSTER TWP. *Report from* WM. P. SUTPHEN, M.D., *Sec*

The Board of Health of Bedminster township are happy in sayi that it has no especial matter to report. Whether from an espec favor from the Giver of all Good, or from reasons in which this Boa may have been in part instrumental, we can say that we have pas through a year of unusual good health.

No contagious diseases have visited us, and malaria, though existi has not assumed a general character, and has confined itself to pla where it had cause to come. Prompt action by the physician of t Board (and our people are becoming more attentive), has had favora results in almost every instance. The water-supply of the towns is by wells and springs.

BERNARD TOWNSHIP. - *Report from* W. PENNINGTON, M

Malaria exists two miles below, in the Morris county plains (a Swamp), but has no effect on health of the villages, and only seems occasion chills and kindred diseases there when the Passaic is low after a heavy freshet.

reets are kept clean, with the exception of some few individuals e pleasure it is to heap their garbage in the public street, which s to be only disagreeable to the eye and good taste, but not preial to health.

ne houses, for the most part, have cellars, which are used for able storage. Houses are generally occupied by single families.

ne public health laws are not kindly considered as of much int by the township officers. In fact, the only party who would ivor to give you a statement of the township condition is my ole self.

e have had sporadic cases of diphtheria, pneumonia, rheumatism, oid fever, &c., but no epidemics.

GEWATER TOWNSHIP. - *Report from* WM. S. POTTER, *Sec'y.*

iere has been no disease prevailing as an epidemic or endemic ig the past year. A few sporadic cases of diphtheria only have rred.

ughter-houses have claimed and received considerable attention the Board. In one case the Board ordered the cessation of htering, and compelled the party to remove to the suburbs. In cases disinfectants were ordered used, and the parties compelled ep them in a cleanly condition, so as not to be a nuisance, detrial to health.

l nuisances of this character have been closely watched and diately abated whenever they came to the knowledge of the d. (This Board has recently printed a valuable circular for holds, which can be had on application.)

SBOROUGH TOWNSHIP. *Report from* W. H. MERRELL, M.D.

ughter-houses are managed fairly well.

ost of the cemeteries are by the church-yards. These have not located with regard to sanitary principles.

ne care over contagious diseases is in the physician's charge; vaccin likewise. This is neglected until there comes a case of vario- and then a rush comes.

st now I am having under treatment a family of whom three of our members are having typhoid fever. The entire water-supply tained from the cellar. Here is a spring of lasting water. The

water does not seem to be very bad, but in rainy times it overf the entire cellar, and this is filled a foot or two for days and w It has not been overflown now for four months, but there is a st which salutes one boldly upon entering. The privy is up the el tion from the spring, but I have not learned that the water is con inated. Further investigations will show.

SUSSEX COUNTY.

BYRAM TOWNSHIP. - - *Report from* JOSEPH MCMIC

Drainage and sewerage on property in the village of Stanho not decided yet. At the last annual assessment of taxes for all poses I was ordered to assess $1,000 for drainage and sewerage.

MONTAGUE TOWNSHIP. - *Report from* GEORGE N. C

We have but one slaughter-house in our township, and our a tion was called to it by some neighbors saying it was a nuisance. Board met and made a thorough investigation of said house and amination of the grounds and surroundings, and came to the conclusion that there was nothing there to constitute a nuis Therefore, the said Board proceeded to issue a permit to Pete Warner, a lessee, to continue the butchering business in the s place, for no specified time, the Board reserving the right to re said permit at any time when, in the judgment of the Board, t was anything to warrant their action.

In relation to vital statistics the reports have been regular fro the practicing physicians in our locality, as well as from other sou

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STILLWATER TOWNSHIP. - *Report from* C. V. MOORE, M

Almost every house in the township has a cellar under it, in w vegetables are stored for the winter. The cellars of many house damp from springs, and in many cases water is conducted into ce and collected in vats for cooling of milk and butter, the farmers rendering the rooms of the house damp and, in my judgment, ren ing the house unhealthy. More than once, I am satisfied, case diphtheria have had their origin from this cause.

e water-supply of this township is mainly from wells and springs, few persons or families depend upon cistern-water for drinking ses.

PACK TOWNSHIP. - - *Report from* FRANK BEERS.

'ew instances were reported where it was necessary for our Board commend the removal of buildings which we believed would detrimental to health. In every case these instructions were lied with.

ere is some malaria, confined mostly to the northern part of the hip. No epidemics of any kind.

UNION COUNTY.

FORD TOWNSHIP. - *Report from* EDWARD S. CRANE, *Sec'y.*

wnship unusually healthy. The prevalent disease, diphtheria. ty cases seemed caused by use of addition to school-house two ıfter finishing plastering, of which only one case proved fatal up e. One trustee of school being away, and the other two differ- ı opinion, the Board of Health ordered the school closed for eek, and the addition vacated for one month and thoroughly ated. Fires were kept in them day and night.

BETH CITY. - - - *Report from* A. R. REEVE.

blic water supplied from the sources of the Elizabeth river, prin- surface-water and spring, by Elizabeth Water Company; quite ber of private wells, also.

ere are thirty-seven miles of sewers, brick and pipe, which empty into the Newark bay and Staten Island sound, and partly into izabeth river, the latter being, however, considered only a tem- outlet.

contagious diseases except scarlet fever and diphtheria.

only deaths of animals of importance was in the case of the of the Elizabeth Ice Company, in which stables over twenty- orses were stricken with typhoid pneumonia within the month tober, eight of which proved fatal. The cause was believed to olluted well within the stable, and improper drainage.

No fire-guard or escape known in the city. Ten fire compan six steamers, furnished with jumpers, tenders, &c.; two hook ladder companies, &c.

Board of Health organized under the recent State laws, and a s tary code adopted and enforced. Eight thousand dollars provided city council.

FANWOOD TOWNSHIP. - *Report from* F. W. WESTC

I know of but one case of disease of animals, which was immedia reported to Trenton. It resulted in a loss of seventy-five hogs. I happy to say that by care the disease did not spread, and has enti disappeared.

Slaughter-houses have ceased to be a nuisance during the past y being conducted in a cleanly manner.

Births, deaths and marriages are reported by those in charge, in case of births when no physician is present the report is made the assessor, due pains being taken to report every case.

Due care over contagious diseases is taken by the Board of Hea all cases being immediately reported first to local Boards, and the necessary to the State Board.

We have no prevalent disease to report. The past year has b a remarkably healthy one. Especialy we are happy to report decline of malaria. A very few cases, not sufficient to say preval have been known in the township. Two or three cases of sca fever have been reported and these of a mild type, and we have free from all kinds of bowel trouble. Vaccination has received attention. A list of those unvaccinated is furnished the Board each y and at this date only three are reported in our limits as unwillin yield to vaccination.

LINDEN TOWNSHIP. - *Report from* JOHN A. ETHERI

The commissioners of the borough of Linden have organize Board of Health for their district and have made some improvem in regard to drains, &c., and will endeavor to look after the he laws.

The health of Linden township has been good the past year. S cases of malaria, but not as bad as past two years.

Altogether, our township is improving, and the inhabitants find the benefits derived from the health laws.

Y OF PLAINFIELD. - - *Report from* O. B. LEONARD.

he source of water-supply is exclusively from wells, either dug, en or drilled. The quality of the water is excellently pure and ever-failing abundance. The average level of this subterranean ly is about sixteen feet below the general surface of the ground. here is no established system of sewers, and the house refuse is harged into private cesspools, built with open bottoms and loosely ed sides. They are emptied at the discretion of the owners or nts, and at very irregular intervals. Outdoor privy vaults are erous, and do not get that careful attention which is necessary for best sanitary condition of the localities in which they are situated.

NGFIELD TOWNSHIP. - - *Report from* W. B. STILES.

pen ditches are mostly used. Some under-draining is being done eavy clay soil. In the majority of cases it is possible to have dry rs. There is a belt of low land of a swampy nature which t to be reclaimed. This could be accomplished by lowering the of the river and then by ditching.

MIT TOWNSHIP. - - *Report from* D. M. SMYTHE, *Sec'y.*

e are gradually correcting health abuses that may exist, more by uasion than force, and our good work is both seen and appreciated.

WARREN COUNTY.

LINGHUYSEN TOWNSHIP. - *Report from* F. RORBACH, M.D.

he year ending with the 1st inst. has been characterized by a ter amount of sickness and mortality than for several previous s, owing, I think, to the singularly irregular atmospheric condi- . The mortality, however, has been mostly confined to the aged chronic cases. The epidemic of scarlatina reported last year as alent during the spring and summer, continued until about De- ber 1st, but the majority of the cases were of mild type, and out he whole number (sixty-four) but three were fatal, one from the r and two from albuminuria, &c. During the winter and spring, e pneumonitis, pleuritis and pleuro-pneumonia prevailed to an sual extent, but all yielded to treatment. Typhoid complications

were less frequent than usual. Sporadic cases of measles and röthe[l]
were met with, but not any of diphtheria. The latter, as also malar[ial]
diseases, which up to three years ago were so prevalent here, have [be]come comparatively infrequent, owing to greatly improved hygie[nic]
conditions. Commencing about the 1st of August and still conti[nu]ing, though rapidly abating, we have been visited by an epidemic [of]
gastro-intestinal diseases—cholera-infantum and entero-colitis in ch[il]dren, and cholera-morbus, enteritis and mild dysentery in adults.

During the past three or four years much improvement has be[en]
made in the surroundings of dwellings as to cleanliness, drainage, &[c.,]
so that malaria, diphtheria and typhoid diseases, once so rife, have [be]come exceptional.

GREENWICH TOWNSHIP. - *Report from* WM. SHERRER, *Se[c.]*

Drink water from cisterns and springs and a few wells. The we[lls]
are mostly hard water. Our streams come from the mountain sprin[gs,]
the water used for watering stock. No sewage supply above sourc[e.]

No drainage; cellars dry; no swamps; malarial fever prevalent[.]

Houses, without exception, have cellars, and largely used for st[or]age of vegetables. Very seldom more than one family in a house.

Intermittent fever prevalent. No inquiry as to loss of anim[als,]
nor as to contagious diseases.

Slaughter-houses not inspected.

HARMONY TOWNSHIP. - *Report from* J. D. DEWITT, M.[D.]

Vaccination is not properly attended to. Many families do [it]
themselves, obtaining the lymph from neighbors, regardless of [t]hereditary tendencies. The trustees of the school districts do [n]ot
require a scholar to be vaccinated as a condition of admittance.

Scarlet fever has prevailed, in a mild form, during the whole ye[ar.]
Many children remained out of school only a few days.

From April to July we had whooping-cough and measles preva[il]ing; also we have had a few isolated cases of dysentery, typhoid a[nd]
malarial fevers, and one death from typhoid fever.

Hog cholera has prevailed somewhat extensively.

KNOWLTON TOWNSHIP. - *Report from* MARSHALL COOL, *Sec[.]*

The general health of the township has been very good. In Ju[ly]
there was a number of cases of dysentery in the village of Delawa[re]

village is located in a valley, quite low. The inhabitants use, ipally, well-water, heavy showers passing over that section of ry flooding the surface of the valley and settling in the wells. was supposed to make the water impure. This caused a greater er of cases of dysentery, of which several proved fatal. We had wo cases of typhoid fever prove fatal.

TOONG TOWNSHIP. *Report from* JEREMIAH YEISLEY, *Sec'y.*

e general topography, drainage and other facts relating to the al outlines of the township have been given in former reports, nothing new has happened relating to these facts. The water-y is pure, and all sanitary arrangements are kept up to the red standard, and there has not been any complaint made to the l on account of violations of the laws of health.

prevalent diseases have occurred among the people of the town-and only one case which was remarkable, namely, the family of ck Kelegher, who lost four children by a disease called the bloody tery; otherwise the general health has been good, and the number aths have been twelve less than last year. There has been a dis-prevalent among the hogs in the township, which I think has iled in the western part of the State. It has taken about one-of the hog stock of the township, but the disease is now about d.

RD TOWNSHIP. *Report from* L. B. HOAGLAND, M.D., *Sec'y.*

ve had a few (perhaps fifteen or twenty) cases of diphtheria in a form, with one or two deaths. Malarial fever is at all times lent among us. In fact, almost every disease met with takes on termittent type.

TOONG TOWNSHIP. - *Report from* S. W. WIEDER, *Sec'y.*

e public health has been good. Malaria has been very limited ast season. People are generally careful about any decaying ables, or anything that will create any nuisance.

ring the season I was called to inspect some calves, pronounced veterinarian to have pneumonia. Five died, but I think it must been some other disease. About midsummer a disease started g the swine in the western portion of the township. It first

appearance in a field where hogs were put to pasture in stubbles left there to get along the best they could. They did not have fresh water, but drank from pools that stood on the ground. disease still exists in Hunterdon and Warren counties. In this to ship the loss is from $2,500 to $3,000 this season, many farr losing all their hogs. Those that have had the disease are worth Several farmers have killed and buried those that have had it. known remedies have been of but little value.

WASHINGTON TOWNSHIP. - *Report from* F. M. COOK, M

Cesspools are the usual termination of drainage-pipes, and are as a rule, cemented. As a general thing, an old barrel, sunken in ground, or a hole filled with stones and covered with dirt, answe the receptacle for all the kitchen drainage.

The houses have cellars, which are very often used for sto vegetables during the winter.

Hog cholera, for the last two months, has been epidemic.

This year has been remarkably healthy. During the early pa last spring scarlet fever prevailed in a very mild form, and, after an epidemic of measles.

PORT OF THE COMMITTEE OF ANALYSTS TO THE STATE BOARD OF HEALTH.

TRODUCTORY REPORT, BY PROF. ALBERT R. LEEDS, PH.D., CHAIRMAN.

wing to the extremely restricted means which were placed at its osal, this committee has been able to do but a small portion of the : which it could have done with great advantage to the public est of the State and the health of its inhabitants. For, besides g charged with carrying into effect the provisions of the general relating to the adulteration of food, drink and drugs, its time and gies have also been largely devoted to the inspection of kerosene the restriction of the sale of dangerous oils throughout the State. n reference to certain articles of food, the committee has, as yet, nothing. Most important of these articles is the air we breathe, h, on account of the development of manufacturing industries, npanied by the production of vile and poisonous gases, has ne, in many localities, polluted to such a degree as to render it sive to the senses and dangerous to the health of the inhabitants in. In England, where similar nuisances have arisen, the government has enforced their abatement by requiring the manufactories : carried on under suitable sanitary restrictions.

ATER-SUPPLY.—Next in importance to air, as an article of is water. It is gratifying to record that in no State has a er amount of attention been paid to this vital subject than in Jersey. Suits instituted at common law in this State have ted repeatedly in the verdict that persons that have polluted, by ge and other ways, the waters of streams, have been guilty of taining a common nuisance, and that the right obtained by ter, usage or otherwise, of employing the water of a stream for

manufacturing or other uses, confers no right whatsoever, under t common law, to abuse it. The same intent is strongly manifest certain specific legislation upon this point. The contrary doctri that rivers can, in any instance, be employed as sewers, if the conv nience or profit of those living on their banks so dictate, is a doctri so fraught with evils of untold magnitude, that no exertion should spared to oppose it, both in writing and in action. The most notal instance of the good results thereby obtained, is that presented in t case of the lower Passaic river, which is used as the water-supply both Newark and Jersey City. In September, 1881, the contamin tion of this stream became so alarming that the Newark Aquedu Board and the Jersey City Board of Public Works appointed a joi Board of Pollution of the Passaic River and its Tributaries, who business it should be to examine into and restrict this growing ev As the result of the labors of this Board, every source of contamin tion has been diligently inquired into and a strict surveillance mai tained. The co-operation of a large number of manufacturers, re dents, and even of communities, sewering into the river, who were first lukewarm or opposed, has been secured. At the time of writin the fruit of these labors is shown by the much-improved and pu condition of the water. This statement being founded not up opinion, but upon the evidence presented by the chemical analysis the drinking-water of these two cities, such analysis having be made on the first of each month for several years past. The gre obstacle to the completion of the work thus happily begun by t joint Board of Pollution, has hitherto been the sewage of the city Newark, this being carried by the reflux movement of the tide up t Passaic river, beyond the intakes of the Jersey City pumping static To obviate this difficulty, both cities endeavored to obtain the passag by the Legislature, of a bill authorizing the construction of a tidal da But this bill failed of passage, on account of its possible injury to t navigation of the stream. A much better plan, however, has recent been adopted by the city of Newark, which is to construct a syste of sewerage that will enable it, after draining from different quart to a common reservoir at a lower level, to pump its sewage and car it out into Newark bay, beyond the influence of the tide. This earn on the part of the city of Newark to do all that lies within its pow of taking care of its own sewage, will, no doubt, urge the committ farther up the river to put into execution suitable plans for doi

wise. They have already the experience of more than a quarter
ı century in England, and are able to adopt, without the costly
erience of disastrous failures, methods which have been tried and
ven successful, of disposing of the sewage of towns much larger
ı any situated on the Passaic above Newark. If these steps are
en there is no reason why the water-supplies of Jersey City and
vark, without abandoning their costly pumping stations, may not
ı become again as clear, attractive and wholesome as the water-
plies of Brooklyn, Rochester and other favorite cities.

t is important, before leaving this subject, to note that disastrous
ıbles may arise in connection with the water-supplies of commu-
es, entirely apart from sewage or any artificial contamination.
ing the course of the year just passed, the city of Hoboken has
ı afflicted in this manner. In the month of July its water-supply,
wn from the river Passaic in its upper portion, at a point where
sewage had entered it, suddenly became very unpleasant to taste
smell. Inquiry revealed the fact that the unpotable condition of
-water was due entirely to natural causes: the vegetable and
r organic matters carried into solution in the water during a pro-
ged period of summer drouth, being greater in quantity than
d be satisfactorily disposed of by the regenerative agencies natu-
 at work in the waters of a flowing stream. On being pumped
the reservoir at Hoboken, an enormous development of oscillariæ
similar plant-growths which find a congenial habitat in non-
ted waters surcharged with vegetable matter, immediately took
e. No time was lost in applying the remedy indicated by the
re of the difficulty, and the water was rendered, and has since
ained, sparkling in appearance, and excellent, both as regards
and smell.

reat assistance has been rendered during the past two years in the
of obtaining accurate statistics relating to the amount and distri-
on of potable water-supplies throughout the State, by the State
d of Water Commissioners. On the basis of the topographical
eys, executed by the State Geologist, this Board has prepared
ographic maps, which have rarely been equalled in perfection and
oughness of execution. These maps are intended to show the
ions existing between the natural distribution of the State water-
ly in its various hydrographic basins, to the artificial require-
ts of the water-supplies of the communities now and in the future,

possibly existant in these various basins. This much-needed work the first of its kind, so far as I am aware, which has been executed wit the United States. The example will be extensively copied, and v supply a solid foundation for the future scientific discussion of vital problem of pure water-supply.

WELLS.—Allied to this work has been that of investigating water-bearing strata in a number of places, to discover whether t are adequate to supply the needs of local communities. The resu obtained have been of a most gratifying character, and will giv great impetus to inquiries of this nature, inasmuch as large commu ties, like that of Princeton and Brick Church, have thus obtai supplies of potable water far in excess of their present wants.

On the other hand, the last year has supplied additional testimo already unhappily very large, of the morbific nature of the water the surface wells located within city precincts or in contiguity dwelling-houses in town and country. The inspectors of numer Boards of Health have utilized the services of this committee by se ing a large number of samples of well-water to be analyzed. In v many instances the analyses have demonstrated the poisonous chara of the samples, and the wells have been accordingly closed by orders of the local Boards. Of the many instances, one may be m particularly cited of a well located in the immediate vicinity o cemetery, and which proved on analysis to be most dangerously p luted, and yet was being used by the children of an adjacent scho house. The Committee of Analysts regards the inspection and c demnation of contaminated surface wells as a work of pressing vital importance. The inspectors of local Boards are requested make a searching inquiry into all such suspected cases within th jurisdiction. In localities where local Boards exist, the cost of s analyses, which is but little greater than the actual expenses of c ducting the same, should be paid by the local Boards. In ot instances, the expenses will be defrayed out of the funds appropria by the State for the enforcement of the general law relating to adulteration of food. The cost to any local Board of such sanit water-analysis is about ten dollars for a single analysis, and fo number of analyses performed at any one time such a reduced sum will comport with the magnitude of the work and the extent of services rendered.

ILK.—The good results attendant upon the enforcement of the to prevent the adulteration and to regulate the sale of milk," rowing more and more apparent. In those cities where a viola- of the provisions of this act has been followed by immediate cution and punishment at the hands of the proper officer of the the diminution in the amount of adulterated milk offered for sale een very rapid; and out of a given number of samples inspected, ercentage of those which have been reported by the Inspector, proven on analysis, to be adulterated, has diminished from h to month until, in some communities, the finding of a sample lulterated milk has ceased to be a common occurrence. So far as ommittee is aware, no sample of milk has been condemned or mposed, under the provisions the act, which was not justified by mplest and most convincing proof of the fact of adulteration. more analyses are multiplied in this and in neighboring States, ore convincingly has it been demonstrated that the standard of e per cent. for the total solids in milk is a just one, and one which es towards leniency rather than the reverse, favoring the pro- rather than the consumer, and making a most ample allowance very possible variation properly due to the influence of season, g and breed upon healthy cows. To debase this standard below e per cent. would be to legalize the traffic in watered milk. ily these views, in consequence of the beneficial operation of the are upheld in most portions of the State, and in those in which a dice against the milk law still exists, signs of the growth of a favorable sentiment are becoming apparent.

e importance of this subject becomes still more apparent in rela- o the vital problem of artificial infant feeding. In the report of tate Board of Health for 1882, the results of an inquiry into ature of and results obtained by all the various articles of infant at that time in the market, is given at length. The final con- n arrived at was, that no artificial food could obviate the neces- or the use of cow's milk as being the most available, and practi- the best substitute for woman's milk in the nutrition of infants. quent research has confirmed the justice of the proposition in maintained. A very extended inquiry and comparison with methods has shown that Ritthausen's method, an outline of n is detailed in the report for 1883, is a rigidly accurate one for nalysis of milk, and this method was followed in the comparative

analysis of a large number of samples of cow's and woman's m
The most important result is contained in the following table:

ANALYSES OF EIGHTY SAMPLES OF WOMAN'S MILK.

	Average.	Minimum.	Maximum
I. Specific gravity	1.0313	1.026	1.0353
II. Albuminoids	1.995	0.85	4.86
III. Sugar	6.936	5.40	7.92
IV. Fat	4.131	2.11	6.89
V. Solids not fat	9.137	6.57	12.09
VI. Ash	0.201	0.13	0.37
VII. Total solids (by addition of constituents)	13.268	10.92	16.79
VIII. Total solids (directly by evaporation)	13.267	10.91	16.66
IX. Difference between VII. and VIII.	0.001	0.00	0.21
X. Water	86.732	83.21	89.08

This extended series of eighty analyses confirm the statem
made in the earlier report (that on infant foods), that the albumin
are the most variable constituent of woman's milk, while the fa
next most variable, and the sugar the least. But they likewise sh
that *the average amount of albuminoids* in woman's milk may
regarded without sensible error, as *two per cent.*

The practical outcome and object of these researches has been
establish the relation existing between the constituents of cow's
human milk, both as their percentage composition and as to t
physiological nature and value in infant nutrition. This being es
lished, it becomes possible for the physician to write out a prescrip
and formula whereby the composition of cow's milk may be so mo
fied that it becomes in composition and properties a substitute
human milk, and whereby it may be used as such in the feeding
infants. Evidently, however, in order that this prescription may
of value, it is necessary that the cow's milk shall not have b
tampered with before being brought into market, but that it s
represent what the prescription calls for, which is whole milk.

Butter and Oleomargarine.—As preliminary to the inspec
and condemnation of substitutes for butter, sold otherwise than un
their real names, the methods of analysis of these articles have recei
careful study by the committee, and a very valuable inquiry into th

ods has been made by Professor Cornwall, and will be found later the report. It is gratifying to learn that the detection of adulons of butter has reached the stage of precision and certainty, so when steps are taken to restrict the illicit sale of such sophisti- articles, the analyst will not be hampered by the raising of s as to the validity of the proof presented by him in court.

EROSENE.—The influence of the repressive legislation against the f dangerous illuminating oils has been very great, and in those ons of the State where regular inspection has been maintained, esulted in driving those grades of kerosene flashing notably be- 00° Fahrenheit, the standard prescribed by law, out of the mar- When the law regulating the sale of illuminating oils went effect in July, 1883, the retail dealers in Essex and Hudson ies generally sold two qualities of oil—the "amber oil," having ning-point varying from 85° to 92°, and the "white or astral having a flashing-point varying from 96° to 102°. During the ear, in which I have had the assistance of Inspector Dr. T. B. nan, 130 samples of kerosene have been inspected and tested in counties. Of these, 40 were amber and 90 white oil. The ng-point of the former varied between 88° and 94°, with an ge of about 92°. Of the 90 samples of white oil, 10 were over flash-test, the highest being 106°, and the others varying be- 101° and 102°. Sixty samples of the white oil fell just below their flash tests averaging 99°. These sixty samples had been nt by the retail dealers as being in most cases 103° flash-test, and supposed by them to be in accordance with the provisions of the Twenty samples of white oil flashed between 94° and 98°, with erage flash-test of 96.5°.

the amber oil, 40 samples were inspected, flashing between 88° 4°. But, as remarked above, this grade of oil has ceased to be where the retailer has been notified of the provisions of the law, s now seldom met with except in localities where as yet a system spection has not been instituted. By inspection of such kerosene s not sold under the name of "head-light oil," Mr. Wallace ob- d 20 samples, all of which flashed between 90° and 95°. Seven les of kerosene sent to Dr. Newton to be tested, proved to be in rmity with the State standard. The latter gentleman calls at- on in his report to the dangers attendant upon the use of gaso-

line and naphtha in stoves for cooking purposes. As yet the c
safeguard against these dangers is, that the law provides that gaso
and naphtha can only be sold in cans or vessels marked "not for in
light."

Apart from these statistics, however, the good results of the ins
tion of kerosene are evident in the greatly diminished numbe
accidents now, as compared with those previously. Happily s
accidents are at present comparatively rare.

FOODS.—The Committee of Analysts in previous reports have ca
attention to the nature and amount of adulteration in many arti
of food. In certain cases this information has been rendered n
specific by means of laboratory investigation during the course of
past year, and will serve as a basis for future practical action.
general diffusion throughout the State of the facts made know
previous reports, and the growing opinion in favor of the pr
enforcement of the law concerning the "Adulteration of Food, D
and Drugs," are inciting the inspectors of the various local Board
institute legal proceedings in regard to certain articles of food,
there is every prospect of an encouraging advance during the con
year in this direction also.

METHODS OF BUTTER ANALYSIS.

BY PROF. H. B. CORNWALL.

The preparation of the following paper was begun at the request Dr. William K. Newton, State Inspector of Milk in New Jersey, continued for the present report of the State Board of Health. object is not to present an exhaustive essay on butter analysis in eral, but rather to treat of the methods commonly employed for ermining the nature of the fat in commercial butters, genuine as l as artificial.

The general subject of butter analysis has very lately been so nirably and comprehensively discussed by Prof. G. C. Caldwell, *ond Annual Report of the State Board of Health of New York,* 2,) that a new paper on the subject would be superfluous, but eral points of great importance with reference to the chemical lysis of butter fat have been published during the last two years. ese, together with some of the writer's own results, will be preted in this paper.

It may be well to present a very brief statement of some of the t rapid methods for a general examination of butter before dissing the special questions already mentioned.

Genuine butter from cow's milk commonly contains from 82 90 per cent. of true butter fat, together with water, curd ein), salts and a very little milk sugar, which are contained in the termilk that remains with the butter after it is worked. Usually ne common salt is also added to butter, and occasionally a little petre and sugar to preserve it better. The natural, more or less low color of butter, varies with the nature of the cow's food, and objection need be made to the use of various harmless coloring tters to heighten the yellow tint; the use of objectionable addins, like chrome yellow and aniline derivatives, although rare, is

said to have been practiced. Genuine butter often loses its yel color on exposure, showing white streaks and spots, which, to inexperienced, may appear as very suspicious indications. It a unless carefully freed from buttermilk by thorough working, is v liable to become rancid, owing to decomposition of the glyceride the volatile acids present, especially butyric acid. Artificial bu contains usually little or no butyric acid and, therefore, selc becomes rancid. No mistake is commoner than the condemnin real butter as a false article on account of this very rancidity, absence of which, in old butters at least, is rather to be taken suspicious sign.

Butter is commonly adulterated in two ways: by the additior various make-weights, such as water, excess of salt, farinaceous s stances, chalk, soapstone and similar materials; and also by the ad tion of various foreign fats. Some of the butter now sold contain true butter fat.

Of the first class of adulterants, little need here be said. T detection is a very simple matter. The mere appearance of the b ter, its behavior in the mouth, and a microscopical examinatior it, will ordinarily quickly reveal the presence of solid, non-f adulterants.

For a rapid estimate of the quantity of non-fatty substance butter, Hoorn's method may be adopted. It was followed by C well (*op. cit.*), and is thus described by him:

"Hoorn, (*Fresenius' Zeitschrift*, 11, 1872, 334,) in a graduated t with a narrower graduated part at the lower end, melted 10 gram butter and mixed it with 30 cc. of petroleum ether by shaking; c ing a cubic centimetre of these matters 1 gram, he found, usually to 14 per cent. in good butter, and over 20 per cent. only in adulter butter; the result is more reliable if the first ethereal solution is canted off and the residue is shaken up with a fresh quantity of ether. All other adulterations that are not fatty will remain with water."

Caldwell applied Hoorn's test as follows: "About 10 grams of butter were put in a tube graduated to tenths of cubic centimetres melted by immersing the tube in warm water; the volume of the me butter was then noted, the petroleum ether added, and after cor the tube the solution of the fat was effected by vigorous shak then, after standing three or four hours, the volume of the ma

fat, collected at the lower end of the tube, was noted and the per . by volume calculated."

y this method, he found as a minimum percentage of non-fatty ers in various butters, genuine and artificial, 7.74; and as a maxi-n, 30.75, the lower figures being generally yielded by the artificial ers.

' it is desired to determine more accurately the proximate constitu- of a butter, the following method may be adopted:

ne or two grams of the butter are heated in a shallow dish in an ath, at 100° C. (212° Fahr.), until it ceases to lose weight. The of weight is water, which should not exceed 20 per cent., although than twice this proportion has been fraudulently incorporated butter by processes known to the initiated. The dried butter is treated with hot ether, which dissolves only the fat. The ether ion may be decanted into a weighed vessel (or passed through a weighed filter, if necessary,) and the treatment with ether repeated the fat is completely extracted. The ether solution is evaporated the fat dried and weighed as before. Its weight ought to be not than 80 per cent. of the weight of butter taken. The residue left ssolved by the ether is also dried and weighed.

qualitative examination of the non-fatty residue may be made ashing out all soluble matter with water, digesting the remainder ammonia to remove the casein, and testing the final residue for h with tincture of iodine; and for mineral matters, chalk, gypsum, stone, barytes, etc., by well-known chemical tests.

ny considerable addition of mineral matters to butter may be ted by igniting a gram or two of the butter and weighing the This does not usually exceed two or three per cent., and, accord-to Blyth, (*Foods, their Composition and Analysis,* 1882,) should in the opinion of most chemists, exceed 8 per cent.

orax or alum, which, according to Dietzsch, (*Nahrungsmittel und änke,* 1884,) have been used to facilitate the incorporation of excess ater with butter, should be sought for in the water solution from ing the non-fatty residue just mentioned. The details of the need not be given.

ne second class of adulterants, foreign fats, furnishes, without t, the most general means of adulterating butter at present; of fats, oleomargarine is the best known. Originally, oleomargarine made from animal fats, but now vegetable oils also enter into its

composition, or into the artificial butters made from oleomargar Lard, cotton-seed oil, benne oil, olive oil, rape-seed oil, and ot vegetable oils also enter into the mixtures sold under the name oleomargarine, butterine, lardine, etc., etc. The writer has b informed by one of his colleagues that cocoanut oil is also used in country, while Dietzsch states that it is used in making "Schm butter."

To Hehner and Angell belongs the credit of devising the f reliable method for the chemical analysis of butter fat. The met depends upon the fact that pure butter fat contains not only glycer of the insoluble fatty acids, oleic, palmetic and stearic, but also a c siderable proportion of the glycerides of certain fatty acids more less soluble in water, especially butyric acid, which is readily solu

The following table from Blyth's *Foods, their Composition Analysis*, London, 1882, shows the apparent general compositio butter fat:

GLYCERIDES EQUAL TO FATTY ACIDS.

Olein	42.21	=	Oleic acid	40.40	
Stearin and Palmitin,	50.00	=	Stearic and Palmitic acids,	47.50	
				87.90	Total insoluble acid
Butyrin	7.69	=	Butyric acids	6.72	
Caproin, Caprylin and Rutin,	.10	=	Caproic, Caprylic and Rutic acids,	?	
	100.00			94.62	Total acids, calcula soluble as butyri

Other animal fats, which are ordinarily used for adulterating imitating butter, contain only the glycerides of the insoluble fa acids, oleic, stearic and palmitic, the theoretical yield of which obtained by saponifying the fat and decomposing the soap with acid, may be placed at 95.5 per cent. of the weight of the fat. F ther investigation has shown that the percentage of insoluble fa acids obtained from some of the commonest vegetable oils is v nearly the same, as in the table below:

Rape-seed oil	95.00
Poppy oil	95.38
Palm oil	95.60
Benne oil	95.60
Olive oil	94.03
Almond oil	94.02

'he foregoing figures are taken partly from Wagner's *Jahresbericht*, 9, 951, and partly from *Archiv der Pharmacie*, IX., 1878, 134.

'ocoanut oil contains, on the other hand, besides the glycerides of aitic, myristic and lauric acids, a considerable proportion of the erides of caproic, caprylic and capric (rutic) acids, which are all e or less soluble in water; caproic acid dissolving with moderate in cold water, while caprylic is soluble in 400 parts of boiling er, and capric acid is but very sparingly soluble in boiling water. sequently, when cocoanut oil is saponified, and the soap decomd with an acid, the above slightly soluble acids are but slowly ned out from the insoluble ones, even with boiling water. They wise distill over very slowly when the decomposed soap solution is ed.

large number of tests, chemical, physical and microscopical, have proposed for the examination of butter. While several of these nore or less useful as accessory tests, none of them is capable of olying a definite solution of the problem.

'he specific gravity test is the most important of the physical tests. as been largely used as a confirmatory test, for which it is generally suited, and Dietzsch (*op. cit.*) prefers it to all chemical or other . He regards any butter having a specific gravity of 0.865 or at 100° C. (212° Fahr.), as adulterated. Blyth regards a specific rity of less than 0.911 at 37.7° C. (100° Fahr.) as strongly indica- of foreign fat. This test, however, has lost much of its value e Muter has described (*Analyst*, VII., 93,) what he considers a on-seed oil product, cotton "stearine," having a specific gravity of 15 to 0.912 at 100° F., which, added to artificial butter, not only s it a better appearance in winter, but increases its specific gravity.

'he only methods accepted as at all reliable for examining butter depend either upon the more or less thorough quantitative deteration of the fatty acids obtainable by decomposition of the fat, or llied operations.

'hree of these methods, which have found extended use, have been l by the writer: Hehner's, as well as a modification of it described 3lyth; Reichert's, and Koettstorfer's. Another method, in actual by some analysts, proposed by West-Knights, (*Analyist*, V., p.) the writer had not time to try. It depends upon the difference olubility between the oleate, stearate and palmitate of barium or ium, and the corresponding salts of the more or less soluble fatty

acids. It is probably open to the same objections which the writer finds against Hehner's process.

Hehner's process (*Zeitschrift für Analytische Chemie*, 1877, p. 145,) consists, as is well known, in saponifying the butter with alcohol and caustic potash, by the aid of heat; expelling the excess of alcohol by evaporation; dissolving the resulting soap in water; decomposing the soap by addition of dilute hydrochloric or sulphuric acid; collecting the insoluble fatty acids on a weighed filter; washing them with hot water until all the soluble (volatile) acids are removed; drying the insoluble acids and weighing them. The details of the method need not be given, but one of them will here be dwelt upon. Hehner states that the washing is to be continued until the filtrate shows no acid reaction, with sensitive litmus solution, and that 3 grains of fat will ordinarily require three-quarters litre of boiling water. This is probably true, but several writers have stated that they found butters requiring more water. Fleischmann and Vieth (*Fresenius Zeitschrift*, 1878, p. 287,) sometimes used 2 litres of water, and state that, even after using more than 2 litres, a very feeble reaction still remained. They finally adopted the plan of washing until 5 cc. of the wash-water showed no diminution of the exceedingly feeble acid reaction with a few drops of litmus solution.

A. Hanssen (*Inaugural-Dissertation*, Erlangen, 1882,) found difficulty, also, in determining how long the washing should be continued. He finally decided to use, at the most, from 2 to 3 litres of water for 2 to 2.5 grams of fat, and to use always a constant quantity of water, as the surest means of avoiding error, either by leaving a notable quantity of soluble fatty acids with the insoluble, or by a possible decomposition of the insoluble acids.

As regards the percentage of insoluble fatty acids in butter, Hehner states that it is usually between 86.5 and 87.5, and he sets the highest limit at 88. These figures will certainly be found true in the great majority of cases, but many instances have been published of pure butter giving higher percentages. Fleischmann and Vieth (*loc. cit.*) found 85.79 as the lowest limit, and 89.73 as the highest, in the examination of a large number of butters, and admit that, in the rarest cases, pure butter may yield 89.8 per cent., so that they set the limit at 90, while admitting the general applicability of Hehner's figures. They distinctly state that a butter, which on imperfect washing yielded 90.06 to 90.47 per cent. of insoluble acids, yielded when

when washed with quantities of water varying from 1,100 to 1,350 cc. fatty acid, from 88.88 to 88.31 per cent. Another butter, which had yielded with imperfect washing from 91.03 to 91.17 per cent., yielded on longer washing 89.73. It was on account of this last butter that they fixed the highest limit at 89.8, and everything in their article points to the conclusion that in their later experiments they were satisfied that they had washed thoroughly enough.

Fleischmann and Vieth further quote from the *Journal of the Royal Agricultural Society* (England), 1877, to the effect that Bell, director of the Somerset House Laboratory, in examining fifty butters as to their percentages of insoluble fatty acids, had found the limits to vary between 85.5 and 89.8.

Kretzschmar (*Berichte d. d. chem. Gesellschaft*, 10, 2091,) in the laboratory of the agricultural experiment station at Bonn, found several pure butters yielding over 89 per cent. of insoluble fatty acids by Hehner's method, and thought the highest limit should be raised to 90 per cent., while indorsing the method in general. Kuleschoff, (Wagner's *Jahresbericht*, 1878, p. 999,) obtained as much as 89.72 per cent. Jehn (*Archiv der Pharmacie*, IX., 1878, 335,) found 89 or more per cent. of insoluble fatty acids in three out of ten butters that he examined. It is true that he deviated sometimes from Hehner's method by collecting the insoluble acids in wax, and that all of these higher figures were obtained in cases where he used wax; but it is equally true that in one of these cases he found 89 per cent. when using wax, and 88.8 without it; and, also, that in four cases where he did use wax his figures varied from 86.6 to 87.5, so that the high figures are not with certainty to be ascribed to the use of the wax. De la Source (Wagner's *Jahresbericht*, 1882, 929,) found, in two tests of butters from cows fed with oil cake, 89.1 and 89.4 per cent. of insoluble acids, and objects to the French standard of 88 per cent. as too low. In the *Analyst*, IV., 197, it is admitted that genuine butter, when old and at certain seasons, may contain nearly 89 per cent. of insoluble acids, in which case it will also contain less soluble acids.

It seems to be reasonably certain that a butter ought not to be absolutely condemned unless the insoluble fatty acids obtained by Hehner's process reach 90 per cent., or very nearly that limit. If this be so, then, as Fleischmann and Vieth show (*loc. cit.*), it might very rarely happen that a butter could be adulterated with 50 per cent. of many foreign fats and yet escape detection; although, accepting

Hehner's limit as more common, the amount of adulteration could not exceed about 25 per cent.

R. W. Moore, however, states (*Chemical News*, December 5th, 1884,) that he has found cocoanut oil to yield only 86.43 per cent. of insoluble fatty acids by Hehner's process, and the experiments of the writer tend to confirm his statement. One experiment, conducted according to Hehner's process, was interrupted by accident, and lack of time before this paper had to leave the writer's hands, has prevented a repetition of it. It was carried far enough to show, however, that after the insoluble acids from 4.158 grains of cocoanut oil had been washed with 1 litre of hot water, there still remained enough soluble acids to require for each successive 100 cc. of wash-water the following quantities of one-tenth normal alkali: for the first 100 cc., 0.95 cc. of the alkali solution; for the second, 0.9; for the third, 0.95; for the fourth, 0.8. Manifestly, the soluble fatty acids were but slowly removed. These figures, calculated as butyric acid, represent nearly 0.2 per cent. of the weight of the cocoanut oil taken for each 100 cc. of wash-water.

A second experiment was instituted according to a modification of Hehner's method, described by Blyth (*op. cit.*) The fat is saponified in a closed flask with a definite quantity of alcoholic potash solution of known strength, and after expelling the alcohol the soap is transferred to a 500 cc. flask and decomposed with dilute sulphuric acid of known strength. The fatty acids are then melted and washed in the flask by successive additions of hot water, the wash-water being each time drawn off from the flask after allowing the fatty acids to become solid by cooling. The wash-water is passed through a filter, the insoluble acids being retained in the flask, and, finally, after sufficient washing, the flask, containing a little warm water, is adapted to an upright Liebig's condenser and boiled, or connected in the usual way with a Liebig, which has as a receiver a flask furnished with a mercury valve to form a closed system. After five or ten minutes' boiling, the distillate is added to the filtrates and the liquid in the flask run off from the fatty acids when cool. To these acids is added the ethereal solution of any insoluble acids adhering to the filter, and the whole is dried and weighed. The soluble acids in the combined wash-waters are titrated with one-tenth normal alkali, each cc. equal to 0.0088 of butyric acid. Blyth says that the wash-water will amount to from 600 to 700 cc. without calling attention in any way

to the necessity of ascertaining that the last wash-water is really free from soluble acids. If logically carried out, testing the wash-water as to acidity, this method may become extremely tedious, and, applied to cocoanut oil, would give the same percentage of insoluble fatty acids as Hehner's original method. If the washing is really to be stopped at 600 to 700 cc., the method becomes an arbitrary one and could not stand in a legal case. It is, moreover, in the writer's opinion, a mistake to allow the wash-water to become cold before it is removed from the insoluble fatty acids. An expert defense counsel might make very plausible objection to such a method of washing.

The method was, however, tested by the writer, limiting his wash-water to 1,050 cc.; the last five wash-waters, 100 cc. each, requiring respectively, 1.1, 0.9, 1, 0.85, and 1 cc. of one-tenth normal alkali for neutralization. It was plain that the soluble fatty acids were regularly being extracted at the rate of about 0.2 per cent. of the weight of the cocoanut oil taken (4.46 grams) by each 100 cc. of wash-water, but the washing was purposely stopped at this stage. Even with this imperfect washing the insoluble fatty acids corresponded, when dry, to 89.70 per cent. of the oil taken, while the soluble acids amounted to 3.44 per cent. The low total, 93.14 per cent., is easily accounted for by the persistent loss of weight of the impure insoluble acids in drying on the water-bath. They were losing a part of the soluble (volatile) acids and constant weight was not to be obtained. Another litre of wash-water would have brought the cocoanut oil nicely within the generally accepted limits for pure butter fat. As it was, it would have passed for three-fourths pure butter. The cocoanut oil, as purified by the writer, was bland in taste and almost absolutely odorless, and the writer has been informed by a colleague that cocoanut oil is used in making some artificial butters in this country. Moreover, Jeserich and Meinert (Wagner's *Jahresbericht*, 1882, 932,) have patented in Germany a process for rendering vegetable oils, cocoanut oil, palm-nut oil, etc., edible and suitable for making artificial butter by treatment with superheated steam, followed by saponification with one-quarter per cent. of calcined magnesia to remove any free fatty acids. After long stirring and careful washing they claim that a perfectly odorless fat, not rancid, is thus obtained. This claim appears to the writer a probably just one, and the possibility that cocoanut oil may indeed enter into the composition of artificial butters cannot be denied. In any event, Hehner's process,

pure and simple, must be held incapable of distinguishing cocoanut oil in mixtures, if not alone, from true butter fat.

Koettstorfer (Fresenius' *Zeitschrift*, 1879, 199,) devised a process for testing butter fat. Since, as already stated, genuine butter contains a comparatively large percentage of glycerides of the more or less soluble fatty acids (especially butyric), all of which have a lower molecular weight than the insoluble fatty acids, it follows that pure butter fat will require a smaller proportion of alkali for its saponification than fats consisting wholly or almost wholly of glycerides of the insoluble acids. Koettstorfer saponifies from 1 to 2 grams of the filtered fat in a narrow beaker of about 70 cc. capacity, covered with a watch-glass, by heating to gentle boiling, at first with stirring, for 15 minutes on a water-bath, with 25 cc. of a solution of caustic potash in highly-rectified alcohol, the solution being of known strength and about one-half normal. The watch-glass is then rinsed into the beaker with alcohol and the excess of potash titrated with one-half normal hydrochloric acid, phenolphthalein being used as an indicator. Two drops of a solution of 1 part of phenolphthalein in 30 parts of alcohol (90 per cent. by volume) is a suitable addition. The litre of the alcoholic potash is liable to vary slightly; hence 25 cc. of it should, from time to time, be tested by boiling as above, without any addition of fat.

Koettstorfer found that 1 gram of pure butter fat required from 221.4 to 232.4 (average 227) milligrams of KHO for saponification. For various other fats he found the following figures: beef tallow, 196.5; lard, 195.5; oleomargarine, 195.5; mutton suet, 197; olive oil, 191.8; rape-seed oil, 178.7. Assuming 227 as the mean for butter fat and 195.5 for lard and oleomargarine, he gave the following formula for determining the percentage of foreign fats in a butter; n representing the milligrams of KHO used for 1 gram of the fat: $(227-195.5) : (227-n) :: 100 : x$. He found that rancid butter required 1.5 to 1.4 milligrams less KHO than when fresh.

The process has found much favor, since a very large number of animal and vegetable fats were found to give, always, figures far below those obtained with true butter fat. A considerable number of such fats have been tested by Valenta (Wagner's *Jahresbericht*, 1883, p. 1152,) and by Allen, (*Ibid.*, p. 1157,) also by Moore (*loc. cit.*). All of these experimenters found that cocoanut oil yielded figures far above those given by butter fat, Moore obtaining from a good refined oil, before and after thorough washing with hot water, 250.3 and 246.2

milligrams of KHO, respectively, for 1 gram of oil. As Moore states, it is possible to mix oleomargarine with cocoanut oil so as to bring the results within Koettstorfer's limits for pure butter. To prove this, he calculated from results of his own tests, the quantities of a certain oleomargarine and the cocoanut oil which should be mixed in order to approach closely to Koettstorfer's two extremes, and the following is one of his results:

Cocoanut Oil (Washed).	Oleomargarine.	Milligr. KHO per grm.
53.1 p. c.	46.9	223.6
75.9 p. c.	24.1	234.9

The oleomargarine alone required 193.5 milligr. KHO.

Relying on Koettstorffer's test alone, no chemist could be certain that he was not certifying to the genuineness of a butter which was really free from any true butter fat.

Reichert (Fresenius' *Zeitschrift*, 1879, 68,) acting on the principle that underlies the Hehner method, modified the process so as to estimate a portion only of the soluble fatty acids, taking advantage of the fact that where an aqueous solution of a saponified butter fat is decomposed by an acid and boiled, the greater part of the soluble fatty acids can be distilled over with comparative rapidity and in reasonably constant quantity.

The fat to be tested is melted, best on a water-bath, any water or other foreign substances allowed to settle and the fat filtered through good filter-paper or cotton. If not perfectly clear it must be filtered again. Then 2.5 grams of the liquid fat are weighed in a flask of about 150 cc. capacity (Erlenmeyer's form is best), 1 gram of solid caustic potash and 20 cc. of 80 per cent. alcohol are added, and the whole heated to gentle ebullition on a water-bath, with frequent agitation, until the resulting soap is absolutely free from alcohol. The writer continues the heating until the air sucked out of the flask has no taste of alcohol; the flask being heated at the last, when danger of frothing is over, by placing it within the water-bath, so that it may be surrounded by steam. The removal of all the alcohol is essential. Afterwards 50 cc. of water is added to dissolve the soap, and when completely dissolved the soap is decomposed with 20 cc. of dilute sulphuric acid (1 of pure, strong acid to 10 of water), which is poured into the flask. The latter is then connected with a small, but efficient, Liebig's condenser, and the contents heated to moderate boiling, with

addition (as proposed by Caldwell) of two or three bits of pumice stone attached to platinum wire spirals, to prevent bumping. (Reichert proposed to prevent bumping by a current of air, which is unnecessary.) A bulb tube, or other contrivance to prevent mechanical carrying over of sulphuric acid, is advisable; but it should not be such as to cause undue condensation of the steam. The writer simply uses a moderately wide tube, ground slanting at the lower end, and reaching about 3 inches above the flask before it bends. The distillate, which contains some insoluble acids, and, in case of foreign fats, much, as it drops from the condenser, must be passed through a small, wet filter into a 50 cc. graduated flask, and as soon as 10 to 20 cc. has come over it is returned to the first flask. The distillation is then continued until 50 cc. has come over, which is at once titrated with one-tenth normal alkali solution. Reichert used one-tenth normal soda, with litmus solution (4 drops) as an indicator. The titration is ended when the blue color of the litmus remains permanent for some time.

As regards the execution of the above test, the writer finds that it is not necessary to weigh the solid potash with extreme care (differences of a centigramme are immaterial), nor to observe unnecessary caution as to the strength of the alcohol; but the method is strictly a comparative one and must not be arbitrarily altered. The writer has not made many duplicate determinations, but the few he has made have been exceedingly satisfactory. He also found that the result was not materially affected by using an inverted condenser during the saponification, to prevent possible loss by escape of butyric ether. Very great differences may result, however, if the sulphuric acid is added before the soap is dissolved.

The potash used for saponification should be practically free from chlorides and nitrates. Both it and the alcohol should be subjected to a blank test.

Reichert in his paper admits that his test needs further trial, and invites the same. From his own results he concluded that the distillate from pure butter would require an average of 14 cc. of one-tenth normal alkali, and never less than 12.5. He also found for:

Oleomargine	0.95 cc.
Rape-seed oil	0.25 "
Kidney fat	0.25 "
Lard	0.30 "
Cocoanut oil	3.70 "
Commercial butter	10.50 "

His formula for determining the percentage of butter fat in mixed fats is $B = 7.3\ (n - 0.3)$; n being the number of cubic centimeters of one-tenth normal alkali used in titration. Adopting his conclusions, the method would be capable of detecting 10 per cent., or any more, of foreign fat.

Meissl (Dingler's *Polytechn. Journal*, 1879, 229,) modified Reichert's process by employing twice as much fat and potash, with 50 cc. of 70 per cent. alcohol, and decomposing the soap with 40 cc. of the dilute sulphuric. He distilled until 110 cc. had passed over, and then titrated with one-tenth normal potash solution. He obtained a range, in the case of 49 pure butters, of from 27 to 31.8 cc., corresponding to 13.5 to 15.9 according to Reichert's method. Meissl's modifications were devised to guard against loss by volatilization of butyric ether and to secure greater accuracy in titration. They have been adopted by some chemists, but they appear to the writer to be cumbersome and unnecessary, although not affecting the result materially. Ambühl (Wagner's *Jahresbericht*, 1881, 839,) used 14.05 to 15.55 of one-tenth normal alkali for 2.5 grams of fat; Medicus and Scherer (Fresenius' *Zeitschrift*, 1880, 159,) recommend Reichert's process, but find that the more fusible part of genuine butter, separated from the rest by partial cooling, may yield higher figures, viz.: 17.3 cc., instead of 14 cc. yielded by a well-mixed butter on which the experiment was tried. (Meissl made a similar observation.) They obtained for butters, from 13.6 to 14; for lard, 0.2; for rape-seed oil, 0.3; for benne oil, 0.35; for olive oil, 0.3; for palm oil, 0.5.

Seudtner (Wagner's *Jahresbericht*, 1883, 979,) following Meissl's method, obtained from a large number of butters, made at all times of the year, figures ranging from 24.25 to 32.25; his lowest results were obtained in February and July. He recommends that the lowest limit be placed at 24 cc. (12 cc. by Reichert's method), but would not, without further investigation, condemn a butter requiring 23 to 23.5 cc. (11.5 to 11.75 Reichert). His experiments were made on butters produced near the Tegren See and Starnberg See, also near Pasing.

Reichert's method is rational and convenient. It was selected by Caldwell in preparing his report (*op. cit.*), and yielded him the figures 14.1 and 13.9 in the case of two genuine butters. He says it "was followed with much satisfaction."

The writer has obtained with it the following results; the genuine butters were known to be such, the oleomargarine butters were bought

as such. The table gives also the results, in most cases, by Koettstorfer's method, and occasionally by Hehner's:

	Reichert. cc. one-tenth normal alkali for 2.5 grm. fat.	Koettstorfer. Milligr. KHO for 1 grm. fat.	Hehner. p.c. insoluble fatty acids.
1. Genuine butter,	14.5	228.2	....
2. " "	14.4	225.4	87.33
3. " "	13.1	224	86.65
4. " "	13.8	222.5	....
5. " "	12.9	225.8	....
6. Oleomarg. butter,	0.6	197.4	95.56
7. " "	0.4	195	....
8. " "	0.5	194.5	....
9. " "	1.4	196.9	....
10. " "	1.55	194.7	....
11. Suspected butter,	13.25	227	86.01
12. Butter,	12.9	226.3	....

There is no doubt that No. 11 was unjustly suspected.

The writer found his duplicate tests by Reichert exceedingly satisfactory in the very few cases where he made them; thus No. 12 gave 12.9, 12.9 and 12.8, the two last results being obtained when an inverted condenser was attached to the flask during saponification, to avoid anticipated loss of butyric ether. Another butter gave, in duplicate tests by different persons, 14 and 13.8 cc. Another butter, about one-half pound in quantity, which gave in May, 1884, 13.8 cc., was kept in a loosely-covered vessel in the laboratory during the next eight months, the thermometer rising at times to above 90° Fahr. It was then found to be very rancid, smelling like cheese, covered on top with a dark mould, and in large part changed to a brown mass. A fair average sample of it now required 13 cc. of one-tenth normal alkali, showing that Reichert's method is still applicable to very rancid butter, although it would doubtless be well to lower the standard for such a butter—about to Seudtner's suggested limits.

Reichert's test has maintained itself very well, so far as the preceding authorities show. Beckurts (Wagner's *Jahnesbericht*, 1883, 978, an abstract from *Pharm. Centralhalle*, 1883, 557), following Reichert's method exactly, used from 15.6 to 17.5 cc. of one-tenth normal alkali, and thinks Reichert's standard is too low. His results, if we accept those of Medicus and Schorer on melted butter already quoted, are unique and need confirmation. Wagner does not state how many butters Beckurts tested. It may be added that Beckurts

gravely asserts that Reichert's proportions must be exactly observed, and naively states that when he dissolved the soap in 150 cc. of water, instead of 50 cc., he used only 11.9 cc. of one-tenth normal alkali to neutralize the first 50 cc. of distillate! It does not seem necessary to raise Reichert's standard until others shall have obtained figures as high as Beckurts found.

A. Hanssen. (*op. cit.*), following Meissl's modification, obtained a confirmation of his results.

E. Reichardt (*Archiv der Pharmacie*, 222, 1884, 93), following Reichert's method, obtained as the average from 35 genuine butters, 14.16 cc. one-tenth normal alkali, with extremes of 13.8 and 14.7. His experiments were systematically conducted so as to include butter made in every month of the year, and with every variety of fodder for the cows, which were of Dutch breeds. Reichardt states also that recent tests by Birnbaum, in Baden, never required less than 13 cc. one-tenth normal alkali, at whatever season of the year.

The only proposition to lower Reichert's standard, or at least the standards of Seudtner and of Meissl, has been made by Munier (Fresenius' *Zeitschrift*, 1882, 394). He concluded, from his experiments on pure butters at Amsterdam, Holland, that the standard should be varied for different months; making it 11 cc. from August to October; 10 cc. from October to March; 12.1 cc. from March to May, and 12.4 cc. from May to August. He found, in the case of one butter, made in December, as low as 9.2 cc., one-tenth normal alkali. His figures, which include a large number of butters, range from 9.2 (in December) to 14.5. Why did he not at once propose to reduce the limit to 9.2 cc., at least for December? These figures of Munier would greatly lessen the value of Reichert's test, if Munier had followed the latter's method. But he did not. He saponified with 5 cc. of a solution of 20 grains caustic potash in 100 grains of 70 per cent. alcohol; that is, he used only one-quarter as much alcohol. Moreover, he decomposed the soap with phosphoric acid solution, instead of sulphuric acid (20 cc. of a mixture of 4 parts phosphoric acid solution of 1.1595 sp. gr. with 6 parts water). Finally, he removed the alcohol by sucking air through—he does not say what, whether through the still liquid soap, or through the flask—after the soap solution had been concentrated by evaporation. These modifications he calls "unessential." In publishing results calculated to discredit Reichert's process, without publishing any comparative analyses

to prove that his process always gave the same results as R
Seudtner (*loc. cit.*) rejects his results altogether. Reichardt sa
is not commendable to offer constantly modifications of a meth
out giving comparative tests, which must show that the new r
tion gives exactly the same results." The experiments of R
Seudtner and Birnbaum, already quoted, were made with the
purpose of testing Munier's conclusions as to variation in th
of Reichert's process with butters made in different months, a
as well as the writer's briefer experience, give his theory absol
support.

Reichardt thinks it possible that the small quantity of alco
by Munier may be the cause of his low figures, and states tha
of his own experiments show this to be the case, but he
analyses to support this statement.

Direct comparison of Reichert's and Munier's methods we
tuted in the laboratory here at Princeton, N. J. When ph
acid prepared from glacial acid by long boiling with water, w
Munier's method gave extremely low figures, often as low a
cc.; but with phosphoric acid (Merck's) bought for the purpo
results were obtained. The experiments so far conducted
that Munier's process gives lower figures than Reichert's, a
by the following tests with genuine butter:

	Reichert.	Munie
No. 1	13.10 cc.	12.00
	13.15 "	12.15
	13.10 "	12.05
No. 2	12.80 "	11.45
	12.75 "	11.50
No. 3	13.10 "	12.45
No. 4	14.25 "	14.20
No. 5	14.40 "	14.20
No. 6	13.60 "	13.15

Until Munier's figures have been confirmed by further tes
own, or by other chemists, they cannot be received as conclus

The essential feature of Reichert's process consists in the
fractional distillation which it secures. The writer has bee
why he preferred to follow Reichert, and distill over only pa
soluble (volatile) fatty acids, rather than, as is the practice
analysts, to distill so long as any acid comes over. To do th
be to lose the whole advantage of Reichert's process. Coco

yielded to the writer, by Reichert's process, a distillate requiring 3.5 cc. of one-tenth normal alkali, the experiment giving these figures three successive times. On adding 50 cc. of water to the decomposed soap solution, and again distilling off 50 cc., a distillate was obtained requiring 2.3 cc.; repeating the addition of 50 cc. of water and distillation of 50 cc., 1.5 cc. of one-tenth normal alkali was required; the fourth trial gave 1.4 cc.; the fifth, 1 cc.; the sixth, 0.9 cc.; at which point the experiment was stopped, although manifestly the volatile fatty acids were by no means all distilled over. A genuine butter similarly treated required for the first distillate of 50 cc., 13.6 cc. of one-tenth normal alkali; for the second, 1.65 cc.; for the third, 0.45 cc.; for the fourth, 0.25 cc.; at which point the experiment was stopped. No further argument seems necessary for adopting Reichert's plan.

The writer is convinced that Reichert's is the only one of the three methods depending on Hehner's principle, which he has tried, that is with any practical degree of accuracy capable of distinguishing between cocoanut oil, in mixtures or alone, and pure butter fat.

The comparative tests of butter by Reichert's method and Munier's modification, were made by Dr. L. W. McCay, of Princeton College, with one exception.

REPORT OF SHIPPEN WALLACE, MEMBER OF THE COMMITTEE OF ANALYSTS.

I submit my report of work done the past year, as one of the analysts appointed by the State Board of Health.

For Dr. Wm. K. Newton, the State Inspector of Milk, I have made a number of analyses of milk which had been condemned by either him or his deputy, and have also made eight analyses of milk, the purity of which was known, at the request of the owners of the cows. The result was to confirm the fact that the State standard of twelve per cent. milk solids is not too high. The prejudice against the milk law which has existed in West Jersey among a number of producers, still continues, but, I think, not to as great an extent as formerly. The quality of milk supplied to the consumer has certainly improved, and especially in Atlantic City.

In the report of Prof. Cornwall, for 1881, he mentioned the fact that in the examination of canned goods, which he had made, he found that canned asparagus contained tin to a much greater extent than any other canned goods which he had examined. Thinking that it would be well to investigate this subject more fully, I have during the past year examined the canned asparagus to be found in the market, with the result of confirming this statement to a greater extent than I had expected. He mentions the fact that in one one-quart can he found 4.13 grains dissolved tin. Whether the length of time the asparagus is canned before being used has any particular influence on the amount of tin taken up, I do not know, but it seems likely it has. The reason for this canned article of food containing tin to the extent it does, lies no doubt in the vegetable acid, asparagaric, present. It is not uncommon to find tomatoes, peas and corn in which no tin can be detected, but in the article referred to, of the ten different cans examined by me, there has not been the slightest difficulty in detecting its presence; although I am not aware of any cases of sickness produced by eating canned asparagus, yet such may have been the case.

There is to be found in the market this same article sealed (?) in glass, and I do not know but that it might be well for the attention of canners to be called to the fact that in putting up in tin they run the risk of some one being made sick by eating it, and to advise them to use glass. In one can I obtained over seven grains dissolved tin (7.11 grains); in another, 3.92 grains, and three yielded over 5 grains. The quantity in the remaining five cans was not determined, but there was no difficulty in detecting its presence. All canned goods should be removed from the can as soon as opened, and, if not used, kept in some earthen vessel, and should by no means be cooked, as is often done, in the original tin. This subject is an interesting one, and I should like to see it examined to the extent of analyzing all the brands of asparagus in the market, and also noting the length of time since being put up.

The examination of kerosene has been continued. I have learned of no accidents resulting from its use in West Jersey, but that there have not been any, I am not prepared to state.

I have examined in all twenty samples, which, at the time they were obtained, I had every reason to suppose would not come up to the State standard, inasmuch as they were not bought for "head-light oil" (150° fire test), but simply for kerosene, which, as a rule, is 110-112° fire test, and which, as I stated in my report of last year, will flash at from 90-95°. They all flashed between these points. I have found no oils sold under fancy names except in one case. This party sold last year, and I have notified him that in case he continues the law will be enforced. He is thoroughly aware of the law, but seems inclined to ignore it. The oil is sold under the name "Genii oil," and is substantially benzine. The samples examined were obtained in Camden, Salem, Atlantic City and Bordentown.

NOTES ON SOME SAMPLES OF KEROSENE.

BY PROF. H. B. CORNWALL.

I have the honor herewith to submit my report on various samples of kerosene. The samples were collected in the latter part of November by Mr. James H. McGuire, Inspector, of Trenton, N. J.

Twenty-two samples were tested, having been collected from the following places: Manasquan, Monmouth county, 4; Englishtown, Monmouth county, 1; Point Pleasant, Ocean county, 4; Trenton, Mercer county, 5; Bound Brook, Somerset county, 4; Lambertville, Hunterdon county, 3; Princeton, Mercer county, 1.

The tests were all made according to the regulations in the last report of the New Jersey State Board of Health; duplicate tests being made of all flashing below 100° Fahr. It will be seen from the figures below that oils are still sold in this State which do not come up to the required standard of safety.

Temperature of oil at flashing................	96°	98°	99°	100°	102°	104°
Number of samples................................	1	1	3	10	5	2

NOTES BY WM. K. NEWTON, M.D., MEMBER OF THE COMMITTEE OF ANALYSTS.

During the past year seven samples of kerosene have been sent to me to be tested, all of which proved to be up to the State standard.

In Paterson, the introduction of gasoline stoves for cooking purposes brought up the question, whether the law contemplated the regulation of the sale of gasoline and naphtha for heating purposes. After reading the law and after consulting legal authority, it was found that the law only regulated the sale of oils intended for illumination.

The agents for the stoves were, however, notified that the gasoline could only be sold in cans or vessels, marked "not for inside light." The papers published articles warning persons about the dangerous character of naphtha and gasoline, and some little good was done.

As was anticipated by me, the danger of using these very explosive articles was soon made very evident by the explosion of two reservoirs connected with the stoves and the destruction of much property. Fortunately, no lives were lost.

Some samples of "noodles" were collected in Newark, as it was thought they were covered with chromate of lead. The samples were sent to Prof. H. B. Cornwall, but at the time of writing the analysis has not been completed.

It seems to me essential, to a proper enforcement of the law, that rules for the government of analysts and inspectors should be adopted.

REPORT OF THE MILK INSPECTOR.

WM. K. NEWTON, M.D., PATERSON, N. J.

I herewith hand you my fifth annual report.

The work of inspection done during the year just past has been much the same as that performed in the past four years, and it seems hardly necessary to burden this report with many details, as it would be but a repetition of former reports.

I have visited nearly all the dairy sections of the State, besides inspecting the milk supplied to many of our principal cities and health resorts.

Mr. Peter L. Vandegrift has acted as my assistant in the southern and western parts of the State, and has inspected the milk supplied to the cities and towns of Gloucester, Camden, Burlington, Salem and Atlantic counties, and Atlantic City, Cape May and other summer resorts. He has proved to be a careful and conscientious worker, and has done exceedingly efficient work.

Mr. Henry B. Everhart, of Stevens Institute, was appointed assistant for Hoboken and Jersey City, and by strict attention to duty has done much to insure the purity of the milk supplied to those cities.

Messrs. Edward R. Martin and William Moller, the former Chemist and the latter Inspector for the New York Dairy Commissioner, were also appointed assistants and given power to inspect milk in this State. This was done so as to enable them to have supervision over milk produced in New York but passing through this State destined for New York city. They have aided me very much.

The New York State Dairy Commissioner, Mr. Josiah K. Brown, appointed me chemist to his department—a complimentary office, but one that gave me authority to inspect milk in that State.

The Legislature of 1884 enacted an amendment to the milk law which gave defendants a right to a jury trial; also, entitling them to

an appeal from justices' courts to the Courts of Quarter S
This law, then, is equivalent to one which entitles all perso
under the milk act, to two jury trials, and hence increases th
of escape through various legal technicalities.

I adhere to the opinion, formerly expressed, that in publi
matters speedy trial is necessary, and the character of the
offered is such that no jury is required. The judgment o
drawn to try cases under this act, is apt to be biased by local
tions and prejudices. This has often proved to be the case.

In a trial held in Sussex county, where not only was the
offered by the State convincing, but was supplemented by a
confession of guilt by the defendant, the jury failed to agree.

In another case, tried on appeal to Quarter Sessions, th
charged the jury to bring in a verdict in accord with the
presented, yet a verdict of "not guilty" was brought in.

During the year twenty-seven complaints have been made
persons violating the milk law. Of these, thirteen entered
guilty; four were tried and convicted, and ten cases are now
in the courts. The sum of $850 has been collected by the
for penalties and should have been paid into the State treasur
this time.

In many instances, when dissatisfaction has been expressed
ing the State standard, I have offered to have any dairy e
free of cost, but the offer has never been accepted.

The limit set up by law is still disputed by all against wh
plaints have been made in court, and I doubt not that if the
was reduced to ten per cent. of milk solids, that some w
found to claim such a figure too high. We have proved to
satisfaction that our limit is just and accurate, and not too
commercial milk. It has been adopted in New York State,
rigorous requirement that all milk shall contain three per cen
and twelve per cent. of cream by volume. In Massachusetts,
per cent. of solids are required by law, and the limit has been
edly sustained by the courts.

Very little assistance was rendered, this year, by local B
Health. With one or two exceptions there seems to be decide
for the work. In Newark, where last year a great amount
was done, hardly any cases have been tried. At Asbury P
usual energy has characterized the local Board, and supervisi
milk-supply has been maintained.

In closing, I would repeat a few suggestions that I have before offered:

With so excellent and comprehensive a law as that enacted to prevent the adulteration of food and drugs, it seems to me unnecessary to have a special milk law. If an amendment was enacted requiring the Inspector to make his complaints, for milk adulteration, under the food law, and at the same time enabling him to inspect other foods, a great deal of very efficient work would be done.

It seems to me necessary, also, that local Boards of Health be invested with power to compel a registration of milk dealers, and to make such registration a prerequisite before selling milk. The cow-stables, also, should be placed under supervision. It is almost impossible for the Inspector to visit all towns in the State, and local Boards should be compelled by law to aid in this work.

The law has operated well this year, and the undersigned, while fully aware of the unpleasant position in which he is often placed, would rely on the support of honest and unprejudiced citizens and those interested in sanitary progress.

CIRCULARS AND LAWS.

CIRCULAR XLIV.

OF THE

STATE BOARD OF HEALTH OF NEW JERSEY.

HOW TO PREVENT THE SPREAD OF SMALL-POX, SCARLET FEVER, DIPHTHERIA AND OTHER COMMUNICABLE DISEASES.

These diseases are spread by infectious particles which pass from person to person, directly or by means of discharges (called secretions or excretions), or by clothing, furniture or other surroundings. We seek to prevent this transfer, chiefly as follows:

a. By avoiding contact as far as possible or proper.
b. By abundant supply of pure air and ventilation.
c. By removing all unnecessary materials which receive or absorb the infective particles.
d. By the most exact cleanliness of persons and things.
e. By disinfectants.

We specify the diseases with which we have most to deal and the chief sources from which the particles are diffused:

f. Small-Pox.—From the pustules, chiefly of the skin.
g. Scarlet Fever.—From the mouth, throat, nasal passages and the skin.
h. Diphtheria.—From the mouth, throat and nasal passages.
i. Measles.—From the mouth, throat, nasal passages and skin.
j. Whooping-Cough.—The expulsive breath from the air passages; also from the sputa.
k. Typhoid Fever.—The discharges from the bowels, and perhaps constant exposure to other secretions or excretions from the patient.

As to small-pox, its contagion is very diffusive, and continues for a long time in the scabs of the pustules.

Scarlet fever is probably conveyed by the peeling skin longer than by the breath, but it is not so diffusive as small-pox or measles.

Diphtheria is not communicable at long distances, except in very close rooms. The membrane itself is the most dangerous source of contagion, particles of which may be carried and impart the disease at almost any distance if there is not full exposure to air.

Measles is very communicable, and probably more so because the cough tends to propel and diffuse the breath, laden with infective particles.

The same is true of whooping-cough, and besides, the sputa or phlegm, when it becomes dry, helps to diffuse the infection.

Typhoid fever seems chiefly to be communicated by the discharges, after they have undergone change by exposure to the air and to materials such as milk, which can absorb the particles, and when used convey it into the system.

It is true of this and the other contagions above named that they may pass into water or food as well as air, and be conveyed into the system by such means.

While these are the chief, they are not the only infections which may be conveyed.

Thus typhus fever is directly conveyable through the breath or the eruption.

Cholera, like typhoid fever, is conveyable chiefly through the discharges.

There is a follicular form of sore throat which is different from that of scarlet fever or diphtheria, which often seems to be communicated by near contact or inhalation of the breath. Direct breathing in of the breath of others is never healthy, and should be guarded against, especially where there is sickness.

Mumps are communicable at a small distance.

Some forms of skin diseases are conveyed by contact. Persons with any form of sore eyes, or unnatural discharges of any kind, should not use a towel which is to be used by others.

It is now believed that to some persons consumption may be communicable where there is imperfect ventilation, or to some susceptible persons who are constantly brought in direct contact with the breath or dried sputa of one sick with this malady. Individual care and

cleanliness go a great ways in preventing the catching and in reducing the severity of any disease.

Personal cleanliness, personal good habits and good health help to ward off many diseases.

We have selected the six diseases first named because they are the chief ones to which so many are exposed, and which, therefore, most need guarding against.

We may name some general rules which apply with nearly equal force to all of these diseases:

1. When any one has sore throat, foul breath, or eruption, however slight, he should be kept apart from all except an adult nurse or attendant, until it is known whether he has some one of the communicable diseases. If there has been known exposure to any communicable disease, special precaution should be used. Mild cases, just because they do not prevent moving about, often communicate these diseases. Scarlet fever does not, as a rule, occur sooner than six days, and diphtheria in from six to twelve days. Small-pox and measles not sooner than twelve days. There should be early diagnosis of what the disease is by some skilled person, even when the attack is mild and does not require much subsequent attendance.

2. Every person suspected or known to be sick of small-pox, scarlet fever, diphtheria, measles, &c., should be isolated from all other persons except necessary attendants. The garments of the patient and those of the attendants should be of such material as will admit of disinfection, boiling and washing. Persons entering or remaining in the room should not take off such garments as hats or coats or gloves, and put them on again in the room, as they thus serve to enfold and convey infective particles. Nurses should have occasional baths and be scrupulously clean, and, if compelled at any time to mingle with others, should first, after washing in some mild disinfectant, expose themselves a few moments to the open air. Close cutting of the hair and beard is often advisable. Women should have the hair covered by a cap; men when nursing, especially in small-pox, should remove the whiskers. It is quite certain that the smaller domestic animals, as the dog and the cat, convey, and may even contract some of these diseases. They should never be allowed in the sick room. No food, or milk or water which has stood in the sick room should be partaken of

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by others. Dishes long in the room should be rinsed in some disinfecting fluid before removal.

3. The bedroom of a person sick with small-pox, scarlet fever, diphtheria, measles, &c., should be cleared of all unnecessary furniture, clothing or drapery, and of all kinds of bed or bedding that are not needed. Articles in the room when the sickness had fully begun, should not be removed to another room until they have been in the open air. Often it is best to remove the carpets, as rugs will answer and are more easily cleansed afterward. The room should never be less than 10x14, with an eight or nine-foot ceiling, and capable of having plenty of light admitted. It is better not to have the bed put in a corner or against walls. It is important that windows be so located as to admit of good ventilation without draught on the patient. If a piece of board is placed under the length of the lower sash so as to cause an opening between the lower and upper sash, or if there is at the top of the window a wire gauze slanting toward the ceiling, or any other arrangement for letting in air and yet interrupting a direct downward *draught*, much air can be admitted without any current being felt.

4. Discharges from the nose or the mouth, and from the throat and lungs, should be received upon cloths or rags or soft paper, so as to be quickly burned, or put into cups or vessels containing some one of the disinfectants hereafter named. Handkerchiefs are convenient, but too often are left to become soiled, or to convey contagion. After they are soiled, at once put them in very hot water or some disinfectant.

The discharges from the bowels and the bladder should be passed into vessels containing a pint of disinfectant, and without undue delay be buried at least one hundred feet from any well. When this is impracticable, the use of the disinfectant should be more plenty, and the removal to the common receptacle should be speedy.

The soiled bed or body linen or towels of the room should not be mingled with other soiled clothes, or put into the general wash or wait for the weekly washing, but should be covered over with a disinfecting fluid or promptly cleansed by hot water, and by the usual laundry methods.

5. No person who has recovered from small-pox, scarlet fever or diphtheria should mingle with others until there has been washing of

of the whole body and entire change of clothing. The time for return to society must be regulated by the physicians.

Two weeks after *complete* recovery from diphtheria or measles is usually sufficient. But by complete recovery—we mean this lapse of *time after* all symptoms have disappeared. After small-pox or scarlet fever, a longer period must elapse, since the skin is for some time separating its contaminated particles. From four to six weeks is the time generally named, but very much depends as to time upon the home cleanliness of the family and of the person.

When death has occurred from any communicable disease, the body should be washed with a chloride of lead or zinc, or corrosive sublimate solution of double strength of that described under disinfectants, and then be wrapped in a sheet wet with the same. Shavings or "excelsior," moistened with a disinfectant, may be placed under the body. In no case should the body be exposed to view. In most cases it is desirable to avoid a public funeral, and especially the attendance of children. Much depends on the skill and knowledge of the undertaker. (See Third Report, pp. 111–121.)

Disinfection of House and Surroundings.—The first requisite is the most thorough exposure of the room to air, unless it is in such very close proximity to other buildings as that it is best to *fumigate* first.

The following directions will guide as to materials and methods of disinfection.

Disinfectants to be Employed.—1. Roll sulphur (brimstone) or chlorine gas for fumigation.

2. Sulphate of iron (copperas) dissolved in water in the proportion of one and a half pounds to the gallon; for soil, sewers, etc.

3. (Zinc solution) sulphate of zinc and common salt, dissolved together in water in the proportion of four ounces sulphate and two ounces of salt to the gallon; for clothing, bed linen, etc.

4. Thymol solution.—Two drams of thymol (crystals) dissolved in ten drams of alcohol, twenty drams of glycerine, and one gallon of hot water.

5. Solution of corrosive sublimate.—One ounce to eight gallons of water.

6. Commercial sulphuric acid.—One pint to eight gallons of water.

How to Use Disinfectants in the Sick-Room.—*The most available agents are fresh air and cleanliness.* The clothing, towels, bed linen, etc., should at once, on removal from the patient, and before they are taken from the room, be placed in a pail or tub of the zinc solution, *boiling hot* if possible.

Unnecessary furniture—especially that which is stuffed—carpets and hangings, when possible should be removed from the room at the outset; otherwise, they should remain for subsequent fumigation and treatment.

All discharges should either be received in vessels containing copperas solution, or, when this is impracticable, should be immediately covered therewith. All vessels used about the patient should be cleansed with the same solution.

One-half pound of sulphate of iron (copperas or green vitriol), or one ounce of sulphate of zinc (white vitriol), or one ounce of sulphate of copper (blue vitriol), or one ounce chloride of zinc (butter of zinc), or one ounce of chloride of lime (bleaching powder), put to a quart of water will answer for this purpose.

Fumigation with sulphur is a practical method for disinfecting the house. For this purpose the rooms to be disinfected must be vacated. Heavy clothing, blankets, bedding, and other articles which cannot be treated with zinc solution, should be opened and exposed during fumigation, as directed below. Close the room as tightly as possible, place the sulphur in iron pans supported upon bricks placed in wash-tubs containing a litttle water, set it on fire by the hot coals or with the aid of a tablespoonful of alcohol or saltpetre, and allow the room to remain closed for twelve hours. For a room about ten feet square, at least two pounds of sulphur should be used; for larger rooms, proportionately increased quantities, placed at two or three points.

To disinfect an ordinary room with chlorine gas: having tightly closed all the openings of the room, place in it an earthen dish containing four ounces of peroxide of manganese. Pour on this one pound of strong muriatic acid, being careful not to breathe the fumes. When certain that continuous liberation of chlorine is taking place, leave the room and close the door.

Cellars, yards, stables, gutters, privies, cesspools, water-closets, drains, sewers, &c., should be frequently and liberally treated with copperas solution. The copperas solution is easily prepared by hang-

ing a basket containing about sixty pounds of copperas in a barrel of water, or by dissolving in hot water a few pounds of copperas.

Corrosive sublimate is cheap and has excellent disinfectant properties, and can be used the same as the iron or zinc sulphates. The vessel containing it should be marked "poison."

Sulphuric acid has been found very effective for sprinkling and general disinfection.

Where a disinfectant wash of pleasant odor is desired for common use by the person sick or the attendant, the thymol solution, derived from thyme and some other plants, answers a good purpose.

We have not especially referred to carbolic acid and other phenol compounds, because, while useful, they are not preferable to those already named.

Body and Bed-clothing, &c.—It is often *best* to burn articles which have been in contact with the persons sick with contagious or infectious diseases (and especially if the disease be small-pox). Articles too valuable to be destroyed should be treated as follows:

a. Cotton, linen, flannels, blankets, &c., should be treated with the boiling-hot zinc solution. Introduce piece by piece, secure thorough wetting and boil for at least half an hour.

b. Heavy woolen clothing, silks, furs, stuffed bed-covers, beds and other articles which cannot be treated with the zinc solution, should be hung in the room during fumigation, their surfaces thoroughly exposed, pockets being turned inside out. Afterward they should be hung in the open air, beaten and shaken. Pillows, beds, stuffed mattresses, upholstered furniture, &c., should be cut open, the contents spread out and thoroughly fumigated. Carpets are best fumigated on the floor, but should afterward be removed to the open air and thoroughly beaten.

After fumigation it is desirable to cleanse all wood-work with soft soap and hot water, to thoroughly brush hard or papered walls and to whitewash the rest. A thorough, general house-cleaning is desirable.

Circular VIII. of this Board, as contained in the third and fourth reports of the Board, pages 85 and 260, gives other important directions as to cleanliness and disinfection.

The question whether beds can be safely fumigated and re-used, will depend upon the amount of soiling or use. All things which are not to be or are found not capable of being thoroughly cleansed, should

be at once burned. As contagions are often stored up and kept over because of imperfect airing and cleansing, safety depends upon what has been done after the cases have ceased.

In these directions it is not claimed that in every case of communicable disease there is to be so much labor and destruction. But the most perfect methods are presented as models, to be varied, if proper, under the advice of the physician, who also thus needs to be reminded of what *thorough disinfection means.*

SPECIAL DIRECTIONS AS TO VACCINATION FOR THE PREVENTION OF SMALL-POX.

With the present facilities for travel and the thoroughfare character of this State, there is no reasonable expectancy that any person will reach the age of twenty-one without great risk of small-pox, unless the disease is prevented by vaccination. The person who runs the risk not only endangers his own life and comfort, but imperils others to a degree not justifiable.

By the provisions of the Health Law of March 11th, 1880, all school boards are authorized to vaccinate, at public expense, any pupils attending school who are unable to procure vaccination.

All local Health Boards need to see to it that vaccination is recommended, as well as rapid isolation of cases secured, if any occur. The cost of local epidemics of small-pox is very great, besides the peril to life and public health. The prevention of the disease is within the range and duty of your control. All our local Health Boards and School Boards should co-operate in influence and provision for more general vaccination, and for revaccination of persons who have not been vaccinated since full growth. The heads of large manufacturing establishments need to attend to it, both in the interest of capital and labor.

Bear in mind and act upon the following suggestions:

I. Let every parent see to it that each child is vaccinated before one year of age, and sooner, if possible.

II. Let no teacher or child be admitted to a public school without vaccination.

III. Let provision be made by school trustees and Boards of Health for free vaccination to such as need this provision. (See *Chapter 153, Section 10, Laws of 1880.*)

IV. Would it not be well, just before each April vacation, to have schools close an hour earlier and thus have a *vaccination day*, on which all scholars could be invited to be vaccinated by their physicians, at home, or, by some public arrangement, at the school building?

V. Do not concern yourself about the kind of vaccine or lymph used any more than you would about the source of medicine you take, but hold the physician responsible therefor. Have the sore examined and take a certificate from the vaccinator that, in his judgment, you are successfully vaccinated.

VI. Have vaccination repeated or retried after the age of sixteen. Most persons, if fully vaccinated the first time, will have but little result from the repetition, but it is advisable to have this additional assurance of safety.

VII. If small-pox or varioloid occurs in your house, do not attempt concealment. At once send for your physician and do as he advises you, or notify the Board of Health. Have every member of the family vaccinated. By some means prevent the possibility of persons coming in unawares. If you know of any person who has been exposed, send him word so that he may be vaccinated.

VIII. Where there are factories, the superintendents should advise or direct all their employes to be vaccinated.

Most of our physicians have full confidence in humanized vaccine lymph, which is easily secured. *Vaccine lymph directly from the animal* is preferred by those who have any fear of communication of other diseases through humanized lymph—a fear that is greatly magnified in the popular mind. It is, nevertheless, due that all have their preference, and that where vaccination is insisted upon as a condition of school attendance, bovine lymph be used, if desired. Many physicians prefer to use this. The New York City Board of Health, 301 Mott street, New York, furnishes it daily by mail. H. A. Martin & Son send it direct from their herd, Roxbury Station, Boston, Mass. Dr. E. L. Griffin, State street, Chicago, is prompt in remittal. Ready supplies can also be had from Philadelphia and other cities. The price per point is about twenty cents, and less in larger quantities. There is reason to believe that much is sold for bovine lymph which is not such, or that there is a failure in effect because of age and imperfect keeping.

We urge upon all physicians great exactness in selecting lymph, and upon the people protection from the disease. Its outbreak every

few years is not a proof of epidemic tendency. The periodicity rather occurs because that, after an epidemic, as soon as years enough have passed for a younger product of children to be out in public child-life, the susceptible material becomes so abundant as to insure extension if a single case is introduced from another section. Then there is an outbreak of small-pox and of vaccination. Would it not be better if, somehow, the young population could be systematically protected? Let our various communities and the local Boards secure this, not only under present threatenings, but as a wise preventive measure.

Small-pox is the one contagious disease which ought never to occur, and which could forever cease if the preventive methods now well understood could be enforced. Every case is the result of public or personal imprudence. Where one has been exposed, unless there has been recent vaccination, he or she should be at once vaccinated. If this has been neglected, it should be done even if there has been neglect for several days after exposure. It is not certain but that thorough vaccination, even when too late to prevent an attack, mitigates the severity of the secondary fever.

GENERAL PREVENTIVE MEASURES.

All contagious diseases should be reported to the Board of Health, since public safety requires it, especially in cities, and no public use is made of the fact, save where there is great danger of an epidemic.

Every local Board should have its executive officer, who should know how to stop the spread of the fire before it has attained headway. We urge upon all local boards the prevention of small-pox, scarlet fever, diphtheria and other preventable diseases.

To pursue a disease, in order to stop it, is often a duty; to get ahead of it, both a privilege and a duty, and very often possible. To prevent is to anticipate, to go before; and Health Boards, as well as individuals, may thus be of great service. Afterthought is sometimes good—forethought is better.

When a case of contagious disease occurs in your district, do the right thing promptly, and do not waste the first week in consultations.

While it cannot be claimed that this or that kind of filth can account for the outbreak of every particular or specific disease, we do know *that cleanliness* of person or of surroundings are great preventives or checks to contagions.

Pure air, pure water, pure homes, pure soils, pure persons and pure surroundings are the surest safeguards against disease of every kind. Where an epidemic occurs in any locality, it may here and there alight upon those whose homes are in good sanitary condition. But it is wonderful to see how general is the rule that pestilences have their choice of persons and places, and how uniformly those who can furnish the most insanitary conditions are surest to be visited. Malignancy is often in direct proportion to uncleanliness and filth, or to errors in methods for the disposal of decayable material.

Secure dryness for every part of your dwelling, and proper drainage, fresh air and sunlight.

Examine the cellar or basement and see that it is dry and clean, with whitewashed walls, with no concealed wells or cesspools, or decaying vegetables.

See that all house soil-pipes and connections are properly trapped, ventilated and disconnected from the outside cesspool or sewer by a trap, and also an intervening air opening, and that the house system also has a ventilating opening on the roof. Have all garbage frequently removed. Decomposing heaps of animal or vegetable matter near the dwelling are always hazardous.

If wells are used for drinking water, their surroundings should be perfectly clean, no vessels being rinsed by them nor any slop-water thrown on the ground near them; nor should cesspools or privies be located within a hundred feet.

If a cistern is used, it should be cleaned each year or oftener. If at any time the odor of water becomes bad, do not use it without boiling, until you have ascertained the cause.

If only individuals and local Boards recognize the conditions under which communicable diseases occur and spread, and, when they do occur, act promptly and intelligently, it is surprising how life is saved, disease diminished and epidemics prevented.

For copies of all circulars, address E. M. Hunt, M.D., Trenton, N. J.

Trenton, April 15th, 1884.

CIRCULAR XLV.

OF THE STATE BOARD OF HEALTH OF NEW JERSEY.

CHOLERA.

TRENTON, N. J., January 1st, 1885.

Whenever the possibility of an outbreak of cholera is threatening, all methods for thorough cleanliness should be applied with renewed vigor. For it is a mistake to suppose that cholera falls like a thunderbolt and accomplishes wide-spread destruction without regard to locality. On this point the Cholera Commission of the German Empire, which convened in 1873, and has met from time to time since and just reported (1882), is full and explicit. "The most important part is played by the locality itself to which the disease germ is brought." It depends in part on "the saturation of the soil with the decomposition of certain substances, and a condition of soil which favors such decomposition." Part VI., pages 314–318, says: "The commission expresses the united opinion of all the most experienced physicians when it says that the strictest attention to all the measures demanded by public general hygiene, offers the best protection against cholera."

Along highways of travel, as wherever else it lights, with occasional apparent exceptions, an analysis of the facts shows the rule to be that its virulence is in proportion to the neglect of sanitary conditions. "It is spread more by infecting localities than by infected persons."

For these reasons city and village officers and all householders should see to it that no form of decomposable matter is kept on or about the premises, that all pipes are thoroughly flushed and ventilated, that there be close inspection of dwellings and surroundings, that pure water and wholesome foods are used, and where soil or cesspools are already filth-sodden and cannot be removed, that the disinfecting solution of copperas and carbolic acid herewith recommended be thoroughly and frequently sprinkled.

But because "all measures for the cleansing of the soil and its better drainage are too often too late when begun, at the time of the outbreak of an epidemic, all places should institute close sanitary

inspection and proper cleansing in advance, so as to prevent an outbreak or limit its extent."

In dealing with epidemics which come from without, a great secret of success is in doing beforehand all that can be done to prevent the settling and spread of the disease, and in learning just what you will do with the first case or cases that occur.

Whatever may be the differences of opinion, we are safe in acting on the basis that the following facts are settled as to cholera:

I. Although the view of direct contagion is not supported, transmission of the disease takes place without doubt in two ways: (*a*) From the patient particles or secretions are thrown off which are not capable at once of acting as cholera poison, but which in a few hours are so changed as to become the specific poison; and (*b*) so also in the presence of such a center of infection, material for disease may attach itself to soil, locality and surroundings, and "whenever it finds appropriate conditions for its reproduction, it may light up an epidemic."

While these facts need not cause attendants to fear catching the disease, they are reasons why the patient should be isolated, why only persons needed should be in attendance, and why all in charge lose not the opportunity of dealing with materials and surroundings which, although not cholera poisons, are quite sure to become so if nothing is done.

As persons may unavoidably be brought in contact with infected localities, such are advised to use, at time of exposure and before each meal, two grains of quinine, four drops of aromatic sulphuric acid, and two drops of the tincture of chloride of iron, in a half tablespoonful of water which has been boiled.

In necessary visits to infected premises "consume nothing while there but the air you breathe and carry nothing home."

What to do with the first case that occurs: Consider that the wise management of it may not only determine the welfare of the patient but of the whole community.

1st. Get the history of the case as soon as possible, and take care of all baggage and clothing and all that appertains to the patient. If you can control where the sick person is to be taken, seek isolation from other houses if possible; if not, an isolated room, and avoid taking the patient into a notoriously unhealthy locality. Carry out a thorough system of disinfection, both in the treatment and as regards all surroundings of the patient. All laundry material should be

placed in a disinfecting solution previous to washing. Some things are best burned if soiled. With this memorandum before him, the health inspector or physician will direct as to what to do with each. He seeks to prevent the locating and transmission of the disease as well as to save his patient. Read carefully Circular VIII. on Disinfectants, or Circular XLIV. on Communicable Diseases.

What to do with premonitory symptoms or with any purging disorder of the digestive tract:

Resolve at once to attend to it and control it, not because it is cholera, but because few who attend to such symptoms ever die of cholera, and because such attacks, if uncared for, seem often to invite the disease. If there is diarrhea, take a recumbent posture, apply a mustard plaster over the abdomen, and if there is a recurrence of discharge, use the following prescription until you have time to seek medical advice:

Laudanum,
Spirits of Camphor, } each *one* part.
Tinc. of Ginger,
Tinc. of Capsicum, } each *two* parts.
Dose, one teaspoonful in a wine-glass of water.
Or,
Compound solution of Opium (Squibbs',
Spirits of Camphor,
Spiced syrup of rhubarb,
Tincture of capsicum, } of each, equal parts.
Dose, for adult one teaspoonful in a tablespoonful of water.

How to take care of yourself and family during a cholera summer:

Practice a close adherence to all the ordinary rules of health. Most persons are best off where they can control all the circumstances of their condition, so as to be able to have good surroundings, good housekeeping, good, well-cooked foods, and conveniences for bathing, exercise, etc., and for immediate rest or care if there is sickness. Avoid cholera districts unless duty calls. Avoid public water-closets. Make no special change of diet, except to avoid those articles of food which you have found to occasionally disagree. Anxiety of mind, overwork, over-heating, and any irregularity of habit or life seems to invite epidemic influences. The more we analyze facts, the more we find that epidemics do not fall on places or persons at random. While

here and there the most correct and those best situated fall victims, with rare exception the imprudent, the exposed, the poor are the chief sufferers. Be particular as to the use of water, unless you know its source. Tea, hot or cold, or coffee, can be used instead. If you have any suspicion of your own well-water, boil what is used for drinking.

Disinfectants—How to use them.

Fresh air has no substitute. In order to cleanse places already infected, or being made so by sickness, there is need of *draught* through the room or building.

Hot air.—Clothing or bedding is thus cleansed by being put in a furnace of dry heat at from 230° to 300° F. It should be subjected to the heat for about one hour.

Hot water.—Very hot or boiling water is applicable to the cleansing of all garments, utensils, etc., admitting of such a method. Put them in when the water is quite hot and allow it to come to a boiling point. Where garments have been soiled, it is well to throw them first into a tub containing a disinfectant solution and from it transfer them to the water.

A. Iron sulphate, called also green vitriol, copperas, green copperas, (2 cents per pound).—Stir in water until well dissolved, in proportion of one pound to a gallon. A teacupful of this solution should be in the utensil before using, or twice as much added to the water-closet each time of use. For use in sprinkling foul premises make it of double strength.

Carbolic acid solution (Squibbs' No. 2) may be added to it in the proportion of one-tenth.

B. Carbolic acid.—One gill to a pint of warm water, for use in stools, water-closets, sinks, etc.

Chloride of Lime.—A valuable disinfectant, chiefly because it contains from 30 to 35 per cent. of chlorine, which is liberated under proper methods of use. If purchased for cities, it should be tested as to the amount. It is not overrated as a disinfectant if only its quality is known, and its mode of use is judicious. It needs slight moistening, frequent stirring, and sometimes the addition of an acid, as vinegar or common spirits of salt. The test of its efficiency is that the odor of it be kept constantly perceptible.

One pound to a gallon of water for utensils, sinks, water-closets,

drains, &c. One ounce to a gallon of water for all linen, which must not be left long in the solution, but wrung out in fresh water.

Chlorinated Soda, usually known as Labarraque's solution, is a convenient liquid preparation, valuable for use in saucers in the sick-room or in utensils. Its odor should be perceptible to strangers entering.

The chlorides are not to be used with carbolic acid.

C. To disinfect a room, ship or building, so needing disinfection that its contents and surfaces cannot be easily dealt with singly, close the room or building, its windows, doors and chimneys so as to exclude the outer air as far as possible. Vacate the house. Break roll sulphur in small pieces, place it on an iron plate or other metallic dish, and set this on a pair of tongs, or other cross-bar, over an iron pot in which there is water, or over a large box of sand, so as to avoid danger of fire from small particles of burning sulphur. Light it by a few hot coals or some alcohol poured around the sulphur and lighted. Then leave and shut the door after you. A pound and a half of sulphur is sufficient for 1,000 cubic feet of space. The sulphur will convert all the oxygen of the air into sulphurous acid, and all organic particles are likely to be changed. Keep closed three hours after the burning has ceased, and then air well six hours before occupying. Clothing and bedding needing disinfection may be hung on lines and left in the room. Most furniture is not permanently injured, but needs dry wiping and then washing off afterwards.

D. *Lime—Plaster—Charcoal—Dry Earth—Sifted Ashes.*—All these have value, chiefly to be tested by the rapidity with which they correct odors. Fresh slaked lime should be scattered in all places of foul odor. It or charcoal or plaster may be scattered over heaps emitting foul odors. Calx powder is made by pounding one bushel of dry, fresh charcoal and two bushels of stone-lime, and mixing them, and is of great practical use.

All these substances absorb foul gases and dry up moisture, and so help to retard decomposition, or else absorb its results. Where lump charcoal is used it may be refitted for use by reheating it. Quick-lime and ground plaster should not be used where they may be washed into pipes and form lime-soap or obstruct by hardening.

E. One-half pound of sulphate of iron (green vitriol), or one ounce of sulphate of zinc (white vitriol), or one ounce of sulphate of copper (blue vitriol), or one ounce of chloride of zinc (butter of zinc), or one ounce of chloride of lime (bleaching powder), put to a quart of water—any one of these is available for neutralizing discharges or for sinks, used in quantities sufficient to cover the bulk they are intended to disinfect. Where any articles are to be moved from one place to another for airing and disinfection, as trunks, clothing, &c., they should be put in a bag or sheet, like a pillow-case, which is yet moist from having been wrung out in one of these disinfecting solutions.

To sextons and others in charge of the unburied dead:

Use any of the solutions named under E, of double strength for washing. Under and around the body (which should be early placed in the coffin, even if not closed,) use dry chloride of lime or the zinc chloride or the iron sulphate. The body may be wrapped in a solution of these or be placed in a solution in a water-tight coffin. When dry disinfectants only are used, fine shavings, or oakum, or tow, or sawdust, mingled with the disinfectant, or with tar, should be placed beneath and around the hips. A plug at the lower bowel prevents after purging.

Burial should be within thirty hours after death, and the coffin should not be closed early and *then re-opened*, since this lets out concentrated and confined foul air.

For copies of circulars send to E. M. Hunt, M.D., Secretary, Trenton, N. J.

CIRCULAR XLVI.

OF THE

NEW JERSEY STATE BOARD OF HEALTH.

TRENTON, October 1st, 1884.

Inclosed herewith please find an outline for the Annual Report for the year ending October 1st. Under the schedule of subjects for report, in the case of cities and townships which have had Boards of Health and reported previous to this year, it will not be necessary to repeat as to *A*, *B*, *L*, *G*, *I*, *O*, as most of the facts are on file.

Under *A*, in the case of all cities or incorporated towns, it is desirable to report the number of acres included in the incorporation.

C. State exact source of water-supply. If a public supply, is it by the city or a private company? How many houses take it? Is the water ever discolored? Has it an iron or other taste? Is it hard or soft? Is it bad at any one season of the year? Are reservoirs or water pipes cleansed? Does the source or stream from which it is taken receive any sewage above the point of supply? Any other facts as to source, quantity or quality. How many depend on wells? How many on cisterns?

D. As to drainage, state whether any system of drainage for the ground is used as distinct from sewerage. Is the usual water-level such as to secure dry cellars? If there are swamps near you, or malaria is frequent, give particulars.

As to *sewers*, state their construction, their grade or fall per 100 feet, their size, their outfall, their flushing and ventilation, and whole length.

F. State whether houses generally have basements or cellars. If a city, whether the basements are occupied; if country, whether largely used for storage of vegetables. How many tenement houses of more than two families?

H. State how far sewers are used. If cesspools, state whether they are cemented, or whether built with open bottom or sides. How are they emptied?

J. State any known or prevalent diseases. Does the assessor inquire each year as to losses of animals and as to contagious diseases? If a city, is there a register of all persons keeping horses, cows, hogs, etc.?

K. Are slaughter-houses inspected so as not to be a nuisance to neighbors?

L. State any new manufactories, and any evil to health therefrom.

Look carefully at each heading and state what you know.

Do not put down a disease as prevalent unless you have personally known of at least ten cases. Often the physician of the Board should make out or aid in the report, and add such suggestions as occur to him; but let there be no delay to make return during October. We must trust chiefly to the assessor and the physician to keep the other members of the Board acquainted with health conditions, and with the rights and duties of the Board. Any neglects reported to us will be inquired into. Refer to Circular XXXIX., before sent you, for further suggestions. We send from time to time lists of physicians

and of undertakers that you may cross off any deceased or removed, or who do not continue their business. Add all new ones who have *settled* for practice in your city or township. Give name and *post office address*, etc., *plainly*, and only those who are practitioners and who *reside* within the limits you represent. Mail all to us, in envelope herewith sent, by November 1st.

E. M. HUNT, M.D.,
Secretary.

CIRCULAR XLVII.

OF THE

NEW JERSEY STATE BOARD OF HEALTH.

PREVENTION OF SERIOUS INJURIES TO THE MIND, THE EYES, THE EARS.

TRENTON, December 1st, 1884.

It is a noble charity for a State to have *asylums*, where those whose minds have been impaired, or those who are blind, or who are deaf and dumb, can be cared for. It is a nobler charity to prevent such afflictions. Both the individual and the State are involved in such losses. The individual is embarrassed as to the pleasure and profit of useful labor, and the State loses his aid in its own industrial resources. The State also has to make large expenditures for the support and comfort of those who thus become dependent. The dictates of interest and economy unite with those of philanthropy, in leading us to seek for the causes of such calamities with a view to prevent or overcome them.

Mental disability is often the result of early errors and neglects. *Spasms* caused by some indigestible article of food, or by some sickness, not infrequently become chronic by neglect. A single attack is often incidental to other symptoms, and of no grave import. But the system is often left nervous or irritable and at a period more or less remote, another attack occurs. Often a habit of abnormal action is thus made permanent without any organic change at the start.

In other cases imperfect control of disposition or unfavorable surroundings develop into insanity, what at first was only defective self-

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control. In some the derangement is the direct result of bodily sicknesses, which have been imperfectly treated or put under skilled medical oversight too late. *Whenever epilepsy or spasm in any form has occurred, it should not only have medical care in the first instance, but the person should from that time be under such medical oversight as will secure treatment to prevent recurrence.* The last ten years mark such advances as to the management of nervous diseases as should lead to a great diminution in a class of cases now found in asylums. The treatment of these cases is very hopeful if begun soon after a first attack. The treatment of all disturbed or impaired mental condition is far more hopeful than formerly, if only it comes at once under skilled treatment. The recovery of persons who have had no treatment for a year is comparatively rare. Many of those now in asylums would never have been there if only their cases had been met at the very beginning of derangement.

THE EYES.

Blindness is rarely congenital, but usually occurs from accident or disease after birth.

Physicians are constantly seeing cases of neglected eye disease, which either end in total blindness or in such impairment of vision as interferes with the pursuit of an industrial occupation. Not a few of these diseases are of a communicable character. A slight inflammation beginning in the eyelids or conjunctiva, or cornea, obscures or destroys vision, although the instrument and the nerve behind it are sound.

Of these the most common is the disease known as purulent opthalmia. We once had occasion to see its ravages in a large school of over a thousand of the London poor, where it was not gotten rid of without the most serious disaster.

C. R. Agnew, M. D., of New York, thus speaks of it:

"The occurrence of an epidemic of purulent opthalmia not only produces cases of partial or entire blindness, but spoils the integrity of the lining of the eyelids. This latter condition of proliferation or thickening of the conjunctiva of the eyelids, and production of so-called granulations is a most obstinate and incorrigible affection. It leads in very many cases to a life of troublesome eyes, to a cloudy cornea and imperfect sight, or ultimately ulcerations, staphyloma, and possibly destruction of one or both eyes.

"The bad effects of this preventable malady are not confined to the limited school life, but run through the entire career of the sufferer or make him a vehicle of contagion to others. I have often seen an entire family inoculated by the arrival in their midst of a case from a public institution. I have seen it carried into a community and there spread by a child discharged from such a school. It will be seen that we have not only the acute malady to deal with, but the baleful after effects, in blindness, chronic eye trouble and the spread of catarrhal eye disease in tenements and other communities. The authorities then, and those who make the reduction of the expenses of public charities the special object of their zeal should become broader students of the matters they undertake to regulate."

We are indebted to Charles J. Kipp, M.D., of Newark, for the following outline and directions as to the prevention of communicable eye diseases:

"HOW TO PREVENT THE SPREAD OF CONTAGIOUS DISEASES OF THE EYE, AND WHAT TO DO FOR THEM.

"The contagious diseases of the eye are the most destructive of eye diseases, and often lead to hopeless blindness, if they are neglected or improperly treated.

"In the vast majority of the cases the contagious disease of the eye is caught by using the towels, sponges, napkins, handkerchiefs, wash-basins or other articles used by persons afflicted with the disease, in washing or wiping their eyes; in other cases, the disease is caused by bringing the discharge from a specific disease in contact with the eyes. From this statement it will be seen that by proper precaution the spread of the disease is easily prevented.

"In order to enable our readers to form some idea of what constitutes a contagious eye disease, we will state that any affection of the eye which gives rise to the formation of much matter (discharge) may be looked upon as contagious. The most prominent symptons of the disease are a copious, thick, yellowish discharge from between the lids; swelling and redness of the eyelids, and redness of the white of the eye.

"To prevent the spread of the disease the patient should, if possible, be isolated; that is, he should have a room by himself, and no one but the nurses should be allowed to enter the room.

"A large and well-ventilated room should be selected.

"All the linen used by the patient should be washed by itself, and, if possible, should be soaked in some disinfectant solution before washing.

"All articles used for cleansing the eyes should be destroyed by burning, especially the cloths and sponges.

"The nurses attending the patient should carefully and thoroughly wash their hands in hot water and use the nail brush before leaving the sick-room, and they should never be allowed to touch any other person's eyes while in attendance on a patient suffering from such a disease as the one here described.

"If the nurse should at any time have reason to think that some of the matter from the patient's eye has got into her own, she should at once wash out the eye with plenty of clean tepid water, and consult a physician as soon as possible.

"No person afflicted with a contagious eye disease, even if it is not sufficiently severe to confine him to his room, should be allowed to go among others.

"Teachers and persons in charge of asylums, schools, &c., should not permit a child with sore eyes to attend school, or be admitted into an institution containing children, unless a competent physician has certified that the eye disease is not contagious.

"A very serious form of eye disease is sometimes developed in new-born children on the third, fourth or fifth day of life, rarely later.

"To prevent this the child's eyelids should be very thoroughly cleansed with a clean soft cloth, or a new clean sponge, immediately after birth, before it receives a bath; and after bathing, its eyes should be thoroughly washed out with clean tepid water, which may be dropped between the gently opened lids from another new and clean sponge or from an eye-dropper. For some days after this, great care should be taken that none of the sponges, napkins or other articles used for the mother are used about the child, and especially about its face.

"If, notwithstanding these precautions, the infant's eyelids begin to swell and become red, and a watery discharge makes its appearance, some days after birth, it may be assumed that the infant's eyes are in great danger, which can be averted only by placing it at once under the care of a good physician, and by faithfully carrying out the latter's directions. *In all such cases it is the imperative duty of those in charge*

of the infant to see that a competent physician is placed in charge of the case, for, if properly treated, the disease will, in all probability, pass away without damage to the sight, while if it is neglected, hopeless blindness is only too often caused by it. It is said that nearly one-half of the inmates of the schools for the blind have lost their sight from this disease. Until a physician can be obtained, the patient's eyes should be frequently cleansed in the manner above described, and all the precautions mentioned against spreading this disease should be strictly observed.

"The danger of blindness from this disease is as great in older children and grown persons as in infants, and no time should, therefore, be wasted in trying the different domestic remedies or patent eye-waters, before consulting a physician."

All cases of inflamed eyes or granular lids should receive the earliest attention.

There is also, in connection with our schools, need of more care as to the eyes. By the relation of light and shade to the room, the position of the blackboards or excessive weariness of the eye, the foundation is laid for permanent impairment of vision. Where there is short-sightedness or other defect, it should early be remedied by glasses. In the best foreign schools it is now the habit to have the eyes of children carefully examined, in order that defects may be noted, and either cured or prevented from becoming excessive.

DEAFNESS AND CONSEQUENT LOSS OF SPEECH.

An analysis of cases found in most of the deaf-mute asylums, shows that by far the larger number result from disease. Scarlet fever, by affecting the middle ear and the chain of bones therein, often causes loss of hearing and speech. Other affections of the throat or tonsils also inflame the minute tube leading from the middle ear to the throat, or so close it as to prevent the record of sound. Many of the minor inflammations of the external ear also have to do with impairment or loss of powers in the organ. In every case of scarlet fever, of diphtheria, and of mumps, there needs to be watchfulness as to the acuteness of hearing for some time after the local swelling or inflammation has subsided. Often the doctor leaves the case doing apparently well, and the impairment goes on gradually afterward. Pain in the ear, of any kind, needs early attention. Even where the middle ear is not

the seat of the trouble, the drum or septum, between the external and middle, may easily become involved from the outer side. Many of the domestic remedies for ear-ache are worse than useless. But little can be known as to the treatment of even the external ear until the canal has been examined as far as the drum.

Often where the family physician may not have all the instruments of precision for testing the acuteness of the senses, his opinion is of great service in directing to those prepared for more accurate diagnosis. It is estimated that a large percentage of those who now find their way to the public charitable institutions of the State, could be prevented from this necessity, if only the possibilities of precaution and early aid were known.

It is the design of this circular to impress the importance of such prompt and intelligent action as will save persons, families, and the State from losses which our charities seek to mitigate, but for which they cannot compensate.

E. M. HUNT, M.D.,
Secretary.

CIRCULAR XLVIII.

OF THE

NEW JERSEY STATE BOARD OF HEALTH.

TRENTON, October 1st, 1884.

G.—AS TO ANIMALS.

INFECTIOUS PNEUMO-ENTERITIS.—SWINE PLAGUE.

There is some difference of opinion as to the earliest appearance of this disease. Diseases of swine until recently were less fully classified than those of most other farm animals, and so under the names of "Anthracoid Erysipelas," "The Distemper," "Hog Cholera," "Blue Sickness," "Typhoid Fever," etc., ailments really different have been associated. At one time it was regarded as caused by a worm, the Stephanurus dentatus (See Cobbold, Fleming, White, Fletcher), which was not infrequently found, but is now known to have no causal relation.

Nusken, in his general pathology on veterinary science, (Munster and Ham, 1829,) and Spinola in his treatise on "The Diseases of the Pig," Berlin, 1842, describe symptoms which many identify as the same disease.

Dr. G. Sutton, of Aurora, Indiana, described this disease in 1858 under the head of "Swine Pestilence," in the *North American Medico-Chirurgical Review.* In the U. S. Agricultural Report of 1861, Dr. E. M. Snow, of Providence, Rhode Island, gives a detailed account of the disease, and states that it was recognized in this country in Indiana, in the summer of 1856.

Harms, (Hanover, 1869,) under the name of pig erysipelas and pig pla-ue (pamphlet), is believed to describe this disease.

Dr. Budd, in a lecture to the members of the Royal Agricultural Society in 1865, and in his treatise on typhoid fever, speaks of it as the exact counterpart of typhoid fever in man, as does Professor Wartly Axe, of London, in *The Veterinarian,* July, 1865. They were both mistaken, as shown by Dr. Murchison and others. Roell (Wien, 1876,) follows nearly the views of Harms. If, as is probable, the disease is included in the one so often described as Anthracoid Erysipelas, according to Fleming (1875), it prevails as a "most fatal and destructive malady in Great Britain, on the Continent, and in America and Australia." In the U. S. Agricultural Report of 1878, Professor James Law accurately defines the special symptoms and gives details of autopsies made by him in Scotland. He has also since made important culture and other experiments as to it. The medical officer of health of Great Britain, in an introductory note to the report of Dr. E. Klein, V.R.S. (1877), says of the swine plague and hog cholera that "the disease is rife in all parts of England and Ireland, and it produces oftentimes great ravages among herds."

Zundel (Paris, 1874,) probably describes the same disease, as does Ballinger in *Ziemssen's Cyclopædia of Practical Medicine,* London, 1875, where he says of swine, "They are subjected to a scourge which is frequently, though falsely, reckoned as anthrax, and is indeed similar to it in many features and equally dangerous, viz., the hog plague."

Dr. J. M. Partridge, in the second annual report of the Indiana State Board of Health (1884), says:

"Swine plague, or hog cholera, undoubtedly appeared in this country as early as 1860. It was not then regarded as a contagious disease, and received no general attention or public notice until fifteen

years later, or about 1875. At this time its wide-spread proportions and fatally destructive character began to cause great consternation throughout the pork-producing regions of the Northwest, as it was estimated that the loss to the producers from this disease amounted to the enormous sum of $15,000,000 annually. In this emergency Congress appropriated $10,000 to be placed in the hands of the Commissioner of Agriculture, for the purpose of investigating diseases of domesticated animals. The Commissioner, finding that the loss of swine was greater in numbers and value than that of all other animals combined, wisely determined to expend the greater part of this appropriation for investigations in this direction. He therefore appointed an examiner in each of the seven States where this disease was most prevalent. Their examinations and reports have done great credit to the authors, and rendered most valuable service to the country."

For one of the earliest and the most thorough inquiries into the disease, we are indebted to Dr. E. Klein, F.R.S., whose valuable research and reports on its history, pathology, etc., are to be found in the Public Health Reports of the Medical Officer of England, for the years 1876 and 1877. These have been followed up by the valuable series of investigations by Detmers, Law, Salmon, and various others under the auspices of the U. S. Agricultural Department. See reports of 1875, 1877, 1878, 1879, 1880, and 1881–1882. Professor W. Osler, of Montreal, has closely studied the disease.

In the fall of 1878, H. J. Detmers, V. S., of Chicago, claimed to find a special form of bacteria, which he called "bacillus suis," which he believed to be the contagious particle. Dr. D. E. Salmon, of the Bureau of Animal Industry, Washington (Report of 1881–2), disputes the views both of Klein and Detmers as to the pathogenic agent or contagion being a bacillus, but views it as a micrococcus (page 269), found both in the glands, the blood and the tissues.

Because of the great mass of investigation and literature to be found on the subject, of which those referred to are but specimens, this Board, under the present provisions of our law, did not regard it as essential to do more as to pathological investigation of the disease than to make enough post-mortem examinations to confirm its diagnosis. As there had been sporadic cases of it in the State before, it was carefully noticed in the first circular of this Board as to contagious diseases of animals, issued in 1879. (See 4th Report.)

It is not necessary here to enumerate all the various symptoms or pathological changes which are found in various cases, but only such as are the most constant and diagnostic. Only the condition of the

lungs, the intestines, especially the large intestine, and the lymphatic glands, are constant as to post-mortem appearances. In addition the changes in the skin, in serous membranes, in the heart, the liver, the spleen and the kidney, are worthy of note.

The disease is not transmissible to men, but is, although not readily, to some of the lower animals, as the rabbit, the mouse and the sheep.

The following is mostly Klein's description of a typical case:

In the severer cases we observe constitutional and other disturbances in the living animal after an incubation period of two to five or more days. The animals do not feed well, are dull, creep into their straw, probably from a sense of feeling cold. Their skin feels hot and the body temperature is raised. This last symptom shows, however, great irregularity and variation. In some of the severer forms we find the skin of the groins, neck, inside of the thigh and perineum swollen and of a patchy or diffused redness. This redness may be absent altogether, or it may be only transitory: it may appear only for a short period at the outset, or near the fatal termination of the disease. Hæmorrhages in the red patches are occasionally seen; they lead to the formation of scabs. The red patches of the skin, at all events, are a very inconstant symptom.

In many severe cases the animals suffer from diarrhea. This may be persistent or only temporary, disappearing and coming on again. When it is of a permanent character, the animals become soon emaciated to a considerable extent.

The respiration is quick and impeded. There is often hoarseness and cough.

On post-mortem examination we find that ulceration of the ileo-cœcal valve, and especially of the colon, is very marked. In the latter we may find confluent ulcerations of great dimensions, occasionally several inches in diameter. As a rule they are round or oblong. The Peyer's glands near the ileo-cœcal valve are distinct. In the lower part of the colon we find the solitary lymph-follicles very marked, projecting more or less over the surface of the mucous membrane as nodular swellings. The mucous membrane of the large intestine and duodenium (in some cases also that of other parts of the small intestine), presents numerous small hæmorrhages. The submucous tissue of the large intestine—especially the colon—is the seat of hæmorrhages.

The lymphatic glands of the pelvis, the mesenteric glands and the glands in the porta hepatis are greatly enlarged and firm; in their interior may be seen fibrinous deposits; their peripheral parts are more or less filled with effused blood.

The spleen is occasionally enlarged, its capsule shows numerous small hæmorrhagic spots. In one case I have seen considerable number of white brittle nodular or irregularly-shaped masses in the

substance and underneath the capsule of the enlarged spleen. The liver is occasionally enlarged, full of blood; in some cases it shows hæmorrhagic spots underneath the capsule.

The peritoneum is highly inflamed, containing numerous hæmorrhagic spots; there is considerable amount of clear or more or less blood-tinged and coagulable exudation in the serous cavity. Masses of solid lymph are found on the omentum, the mesentery and the serous covering of the large intestine, which in some cases show also numerous minute false membranes. The pleura and pericardium are in most cases more or less inflamed, their cavities containing inflammatory exudation.

The lung is the seat of more or less severe lobular pneumonia; considerable portions of both lungs become airless and more or less consolidated. The trachea and bronchi contain muco-purulent matter slightly tinged with blood.

The tongue, mucous membrane of mouth and epiglottis occasionally show hæmorrhagic patches or even ulcerations.

The disease is highly infectious. By direct experiment it can be proved that the diseased lung, the contents of trachea and bronchi, the diseased intestine—particles of ulcerated mucous membrane that are discharged with the fæces—the diseased spleen aud the peritoneal exudation contain the materies morbi. The disease can be produced in a healthy animal by inoculating a minute quantity of the materies morbi into the skin or mucous membrane. The disease may be induced also by mixing the materies morbi with the food. I have not been able to determine definitely, whether the fresh blood of diseased aminals when inoculated does or does not, as a rule, induce the malady. The disease can be produced by simple cohabitation with a diseased animal, or by putting a healthy animal in a place where a diseased one had been previously kept.

The eruption is not always present, and yet most look upon it as an eruptive or exanthematous disease. In severe cases it is rarely absent. There is a "uniform or patchy redness on the under part of the abdomen and on the inside of the forelegs and thighs. The eruption is in the form of small round raised spots of a papular appearance, but the minute pimples sometimes fill with a thin fluid, and so become vasicular and dry away into crusts." According to Prof. Axe the pimples are often successive to a third or fourth crop.

Klein made various culture experiments and cautiously claimed that the microphyte or "specific plant germ," found by him, differed from any other known. (See pages 169 and 217.)

A condensed and well arranged description of the disease is to be found in "The Relation of Animal Diseases to Public Health," F. G. Billings, D. V. S., New York, 1884.

The disease, when caused by inoculation, developed in from three to five days, but its period of incubation, when caught, is not very accurately known, being given as from five to fifteen days. It is communicable by contact, through the air and by articles or persons that have been in contact with the pens, &c.

"The external symptoms are a dullness of the eyes, the lids of which are kept nearer closed than in health, with an accumulation of secretion in the corners. There is hanging of the head, with lopped ears, and an inclination to hide in the litter and to lie on the belly and keep quiet. As the disease advances, the animal manifests more or less thirst, some cough, and a pink blush or rose-colored spots, and papular eruption appears on the skin, particularly on the belly, inside of the thighs and forelegs, and about the ears. There is accelerated respiration and circulation, increased action of the flanks in breathing, tucked-up abdomen, arched back, swelling of the vulva in the female as in heat; occasionally, also, of the sheath of the male, loss of appetite, and tenderness of the abdomen, sometimes persistent diarrhea, but generally obstinate constipation. In some cases large abraded spots are observed at the projecting points of the body, caused by separation and loss of the epidermis. In such cases a slight blow or friction on the skin is sufficient to produce such abrasions. In many case the eruption, blush and spots are entirely absent; petechia are formed in only about one-third of the cases. In some cases there is considerable inflammation of and discharge from the eyes. Some animals emit a very offensive odor even before death. In large herds, where the disease prevails extensively, this offensive effluvia can be detected for a great distance to the windward. In nearly all cases there is a weakness or partial paralysis of the posterior extremities, and occasionally this paralysis is so complete in the first stage of the disease as to prevent walking or standing.

"As symptoms of special diagnostic value, which are scarcely ever absent in any case, the following are mentioned: Drooping of the ears and of the head; more or less coughing; dull look of the eyes; staring appearance of the coat of hair; partial or total want of appetite for food; vitiated appetite for excrements; rapid emaciation; great debility; weak and undecided, and frequently staggering, gait; great indifference to surroundings; tendency to lie down in a dark corner, and to hide the nose and even the whole head in the bedding; the specific offensive smell, and the peculiar color of the excrements.

"If the animals are inclined to be costive, the feces are generally grayish or brownish, black in color and hard; if diarrhea is present, they are semi-fluid of a grayish-green color, and in some cases contain an admixture of blood."

The disease is not transmissible to man, although some are sickened by its odor. It is transmissible by inoculation and perhaps by contagion to some of the lower animals, as rabbits, mice and sheep, but not readily. Pigs that are kept in a filthy way, that drink polluted water, or are kept in open fields exposed to changes of weather, contract the disease when it is prevalent more readily and severely than others. It seems especially active when the grass is wet, or when animals by reason of pasturage in stubble or for other reasons have sores or scratches about the snout or body. The infection is exceedingly persistent, and while cold weather and the slaughter of so many hogs in early winter diminishes the disease, the freezing of the virulent matter does not destroy its activity (Law). While no ill results followed experiments as to the use of the salted and well-cooked meat of mild cases, as the amount of fever and the changes which have occurred in cases apparently not severe cannot be fully known, any animal at all sick should not be killed for food.

It thus appearing that the character of the disease, its symptoms, its lesions and its contagiousness are well understood, the practical question is what is to be done to check the ravages, since it is now domiciled in over thirty States, and yearly causes the loss of animals whose value counts into the millions of dollars.

I. No reputable authority claims that much is to be done for the sick swine by way of treatment. The most of these die, and if they recover are so reduced or diseased as not to be worth fattening.

II. This, however, does not at all indicate that nothing is to be done by way of *preventing* the spread of the disease. The following are the chief directions when a case occurs. *Do not remove the sick pig, but remove all the rest.* If the herd is a large one, divide it into two or three herds. Let new, temporary pens be made of entirely new boards, with new troughs, new pails, new swill, and to which or about which no one shall go who has had to do with the old pen. This course carried out *accurately and rigidly* will save most of the hogs in most of the cases. If after removal new cases occur, at once transfer them to the old pen or kill them, and if there are more than one or two cases move the hogs again. After the first case occurs,

give to each well hog, of one hundred pounds weight, three times each day, a full half teaspoonful of flowers of sulphur dissolved in milk. For those of heavier weight increase the dose in proportion.

Some good authorities claim equally good or better results from the use of ten drops of carbolic acid (full strength) to each one hundred pounds of weight, and given three times per day in solution of a half pint or pint of water.

The only other remedy suggested by a sufficient number of good authorities, is some one of the combinations of sodium with sulphurous acid known as sulphite or bisulphite of soda.

Half dram doses, three times per day in their usual food, may be given for each one hundred weight of flesh. We prefer the bisulphite in about teaspoonful doses.

You may choose either of these three named remedies and give them systematically, and see that the pig *really gets* the amount attempted to be given. The treatment should be followed up for at least two weeks.

The same treatment in double quantities for all these remedies is claimed to be of service to sick hogs as well, but full proof cannot be found. In giving such medicines to swine, it is often best to scoop out a part of a cooked potato and then plug it with part of another, and so give it to the animal, as the potato is likely to be eaten, and thus the whole amount given reaches the stomach. The scattering of fine charcoal, of sulphur, of lime, or of plaster on the boards, or more cleanly parts of the pen near the trough, may also be wise. It is not believed, however, that a pen in which a case has occurred ought to be occupied at all by the well hogs, or by any new herd, until all straw and manure have been entirely removed, all fences whitewashed, and all troughs, and pails, and swill barrels disinfected as directed in former circulars.

As the disease is no doubt often conveyed from the pens or herds of neighbors, or from running water which comes through the premises of those who have the disease, or even through the air from adjacent farms, too great care cannot be taken by any one whose herd has it, that it be not transmitted. Hogs turned out to pasture, especially before or after it is wet with dew or mild rains, seem to get it, because the wafted material is more apt to alight and remain amid moisture. There are some remarkable examples of exemptions to herds whose owners have been skilled and consistent and exact in their

precautions. Where a neighbor's herd is affected, in the opinion of most authorities it is wise to put adjacent herds on some one of the treatments named, and to use precautions as to the field exposure, as to cleanliness, and even as to change to new pens, so as to anticipate attack.

When hogs die or are killed they should be promptly buried not less than *four feet* under ground, and where other hogs will not have access for two or more years.

No hogs should be allowed to run at large, and if owners are careless, Chap. LIV., Sec. 4, Laws of 1881, provides a remedy.

As the disease is so readily transmissible, swine sent by cars or any public conveyance may so infect these as to impart the disease to other animals.

If the disease continues to show the virulency and extent shown recently in this State, and so common in portions of other States, some special powers should be given township Boards of Health acting under the directions of this Board and its veterinary assistants. Already the veterinarians, whose directions have been closely followed, attest the value of the methods suggested. It is believed that known preventive measures, faithfully carried out by owners, can prevent or much restrain the spread of the disease.

While the disease now attacks herds that are well kept, we are learning from this and other animal diseases the direct result of ill-treatment of our domestic animals.

Dr. Detmers has well said:

"The domesticated animal does not approximate the habits of his pioneer ancestor in point of cleanliness. It is the instinctive habit of the animal to bathe in water and wallow in mud to counteract heat and as a protection against flies; but in a state of nature, when the mud has served its purpose, the animal cleanses himself by friction with the nearest tree; the filthy bed which the domestic animal becomes satisfied to occupy in a state of confinement is never occupied by animals running in the forest, and given opportunity to make and change their sleeping-places at will—in short, when allowed to provide for his own existence, he exercises a more intelligent regard for his wants than is ordinarily exercised for him by his owner, who attempts to supersede instinct by reason."

Cobbold, in his "Treatise on Animal Parasites," says that "swine are not attacked by a greater variety of entozoa than other domesticated

animals." The prevalence of these and of various microphytes or "disease organisms;" animal or vegetable, in animals, is usually the result of the artificial conditions established by man. We are to seek riddance from such destructive animal pests, not by finding specifics for disease, which do not exist, but by finding our way back to natural methods of dealing with animals, and so preventing those immense losses to agricultural and stock-rearing industries, which are so rapidly increasing. Thorough and enforced cleanliness for all domestic animals is for the interests of their owners, because for the welfare of the animals. Impure water, spoiled foods, poor ventilation, filth or imperfect care generally, will tell upon man or upon beast, and, unfortunately, the innocent owner must suffer with the ignorant and the careless. This and every other epizootic or enzootic prevailing among animals should lead to a careful study of the indications as to food, habits, care, and all that contributes to their most perfect health.

CIRCULAR XLIX.

OF THE

NEW JERSEY STATE BOARD OF HEALTH.

TRENTON, December 1st, 1884.

(H. AS TO ANIMALS.)

HUSK OR HOOSE AND TUBERCULOSIS IN CATTLE.

HUSKS OR HOOSE IN CATTLE.

Among the various forms of parasites that infest the lower animals, are those belonging to the nematoda (round worms.) Some of them are common to men and animals. Others are not, in any of their forms of life, transferable from the one to the other.

Cobbold says the nematodes of the ruminants (cud-chewing animals) are both numerous in and destructive to their bearers, those infesting the lungs being productive of a parasitic bronchitis, termed husk or hoose. In cattle, the lung-worm (strongylus micruris) is particularly fatal to calves, while strongylus filaria attacks sheep, and

especially lambs. A larger but less common lung strongyle (S. rufüscens) is sometimes found associated with the latter. In 1875 I conducted experiments with the view of finding the intermediate hosts of strongylus micruris, and I arrived at the conclusion that the larvæ of this parasite are passively transferred to the digestive organs of earth-worms. The growth and metamorphoses which I witnessed in strongyloid larvæ taken from earth-worms (into which I had previously introduced embryos) were remarkably rapid.

The strongylus micruris is quite similar to the strongylus filaria, the parasite found in the lungs of lambs and sheep. To the affection, as found both in lambs and in calves, the names husk or hoose, phthisis pulmonalis verminalis, and parasitic bronchitis are given. It is better, however, since the worm itself is somewhat different, to give different names. Neither should be called phthisis pulmonalis verminalis, since phthisis has come to be so exclusively applied to consumption, or wasting due to tuberculous deposit. The name "parasitic bronchitis" is the best, if a general term, applicable to all animals thus affected, is used.

The bronchial cough of the calf makes the name husk or hoose quite distinctive for it. The parasite strongylus micruris gains access to the pulmonary tissue and bronchial tubes through the circulation, the ova being absorbed from the digestive canal. The seat of the irritation is indicated by a bronchial cough, "husk or hoose," loss of flesh, a varying degree of constitutional disturbance and death by suffocation, if the sufferer is not relieved. If any mucus be coughed up and examined, the parasites may be discovered. Bronchial irritation occurring in calves during summer or autumn, should always be looked upon with suspicion, and its source thoroughly inquired into. The disease is rarely found in cows and oxen, although cases of it do occur in these. It is said to be most frequent where calves are exposed to dews and pastured on wet pasture or low, ill-drained lands, or where, in dry summers and scarcity of water, they are supplied by stagnant pools which eventually become dry. It is most common in the late summer and fall. Most of the veterinarians of the Board have had occasion to distinguish between it and pleuro-pneumonia, as it is often confounded therewith.

The treatment recommended is as follows: "The calves are to be warmly housed if the nights be cold; the affected animals are, upon all occasions, to be removed from the healthy—not that the disease is

contagious in itself, but that the parasites, or their ova, are apt to gain access in the bodies of the healthy—and, for the same reason, the healthy should be removed to fresh pasture and to dry situations, as the fields upon which the disease has prevailed will, for a time at least, be tainted by the parasites and ova." In treatment, chief reliance is placed on the inhalation of fumes, either of sulphur or chlorine, as both sulphurous acid and chlorine gas will kill the parasite. The mode of using these is the same as in the disinfection of dwellings, and the details can be given by any competent veterinarian.

Generally three or four inhalations, of fifteen minutes each day, will much limit the disease and finally cause it to disappear. Salt, turpentine, lime-water, etc., have been found useful.

"The enclosures in which the animals have been temporarily housed should be thoroughly scoured with boiling hot water impregnated with salt." The free use of commercial sulphuric acid, one pint to eight gallons of water, sprinkled over the yard and thorough whitewashing, add to the security against the recurrence of the disease.

TUBERCULOSIS IN CATTLE.

The existence of tuberculosis in animals, and especially in cattle, has long been recognized. Several circumstances have of late led to a closer inquiry as to it. The disease has seemed to be largely on the increase. Villemin and others have established its communicability, both by the exposure of animals thereto and by the test of inoculation. Fleming has given facts in support of its probable spread by infection and to show that the disease may, in exceptional circumstances, be conveyed from diseased to healthy animals.

Creighton and others claim to have shown that human and bovine tuberculosis are so nearly the same disease as to be interchangeable. Gerlach claimed, from his feeding experiments, that the flesh and milk of tuberculous animals must be excluded from human food, since by using it in its raw or half-cooked state tuberculosis is liable to be reproduced in man. The hereditary tendency of the disorder seems to be established. The possible communicability of consumption in some cases has also given a new interest to bovine tuberculosis. These various views by competent and skilled observers, even if not yet accepted as conclusive, cannot but lead to the most earnest inquiry, since the health and welfare of man and of all other animals is directly involved.

In the report of the New Jersey State Board of Health, 1881, T. B. Rogers, D.V.S., thus refers to it:

"Tuberculosis is not uncommon. In one autopsy made last spring the tubercular deposits extended to almost every tissue of the body. The first noticeable trouble in this case was mammatis, the post-mortem showing that the hardening of the mammæ was due to tubercular deposit and not to common or ordinary causes of the trouble. Practitioners, in view of this, will do well to exclude tubercle before pronouncing this affection local and harmless. Whether the milk from a tuberculous animal is fit for human food, or her flesh fit for beef, is a question which should receive grave consideration from your Board. My own opinion on this subject is very decided, and I strongly advocate the slaughter and burial of these cases wherever found."

During the last summer a series of cases came under the examination of this Board. Cases having occurred in a valuable herd in this State, it became our duty to consider whether it was to be regarded as subject to the law relating to the contagious diseases of animals. At that time, with the advice of the veterinarians in attendance, it was decided that no prohibitory action was required, but that full inquiry as to the extent and character of the malady would be desirable. As a result, it must be stated that there is a growing conviction on the part of veterinary authorities that the disease is not infrequently communicated from animal to animal; that, in some cases, both the meat and the milk may become unfit for food, and that stables in which it has occurred may become so permeated with the infection as to give it to the animals not in direct contact with the diseased ones. Within the last year, one owner in New York State of a herd of Jerseys, has been compelled, after other losses, to slaughter forty-five of his cattle. If the views of its communicability are accepted, it must be remembered that it is not claimed as a diffusive contagion, or that the meat is always unfit for use, or that the milk is harmful, unless the udder itself is diseased. The Board, however, thinks it proper to issue a circular which shall give some description of the disease, of its alleged causes, and a statement as to the precautions to be taken for its prevention, or as to herds in which it is found to exist.

"It is characterized by the deposition of tubercular matter in serous membranes, in the lungs and other organs, wasting of the tissues and other signs of imperfect or malnutrition, which lead more or less rapidly to a fatal termination; the tubercular matter undergoing various

characteristic changes, according to the length of time it has been deposited, and modifying the symptoms accordingly." (Fleming.)

Prof. Walley speaks of the serous membranes, such as the pleura and the lining membrane of the abdomen, as showing tubercular lesions oftener than any other structure.

The most usual form seen with us can be thus described: "The tubercle at first is very small, about the size of a pin's head, then that of a pea and a hazel-nut. In the course of time these become converted into small, hard, globular nodules, of the color of connective tissue; gradually, however, they become gray and somewhat translucent in sections, and constitute the so-called gray or fibrous tubercle. These gray miliary nodules may remain discreted and scattered over the surface of the membrane like millet seeds; they may become connected together by delicate bands of new connective fibrous tissue, forming the so-called grapes of England, the angleberries of Scotland; or they may become aggregated together and form immense masses, which may degenerate in particles or en masse, or they may remain fibrous.

The "grape" or "angleberry" appearance is, perhaps, better described by the German name of "perlsucht" or pearl disease. This post mortem appearance, so often seen, is very diagnostic.

Besides the serous membranes, tuberculosis of the lungs, tubercular infiltration of the lymphatic and mesenteric glands, tubercle in the liver and in the alimentary tract are not rare. Fortunately, tuberculosis of the mammary gland or udder is not so frequent as of other glands.

Where there is tubercular deposit in the digestive tract the fæces are not infrequently tinged with blood. Ulcers are found here and there. Prior to irruption of the ulcer, in chronic cases, the mucous membrane is elevated by the tuberculous nodule, which is readily distinguished by its yellow color. These nodules are found in various parts of the intestinal tract.

Tuberculosis of the lungs, when occurring in animals, has not a few of the symptoms which characterize the same disease in man. In these cases, cough is a more prominent symptom and the diagnosis from pleuro-pneumonia, especially in the chronic stages, is not always easy.

In whatever form tuberculosis attacks cattle, the animal does not thrive. With some, the symptoms are loss of appetite, scouring, and

mucous or dysenteric discharges and other symptoms of imperfect digestion. With others, the cough and uneven respiration indicate the affection of the respiratory organs. Where the lymphatic or mesenteric glands are involved, the animal will not take on flesh and remains long in an unhealthy state. Where the mammary gland is attacked, the diseased part, when cut, is apt to have a reddish hue, and the secreted milk is liable to be contaminated with the tuberculous products. In most cases the milk deteriorates in quality, if it does not diminish in quantity.

When we come to examine into the causes of tuberculosis among cattle, they are found to be very similar to those detected as to man. That it is hereditary, the discovery of the disease in calves, and its tracing in the offspring of unhealthy cattle, abundantly proves.

High breeding, and especially in-and-in-breeding, seems to favor the development of the disease. Animals ill-fed, or kept in large numbers in poorly aired apartments, are most likely to show the disease.

Cows which are abundant milkers, or which are forced in order to secure large returns, are most apt to fall victims to the malady. There is also much probability that an animal seriously affected with tuberculous disease will impart it to other susceptible animals near by. Cases enough are on record to show such transfers, and that a particular stable, or part of a stable, where cases have occurred, seems unhealthy for other animals until full disinfection has been practiced. It may not be so actively communicable as to deserve to be called contagious, as many claim that the cases in which it is communicated are exceptional. They are chiefly, if not entirely, those in which the lungs are so diseased as that the breath is full of infective particles; those in which the discharges from the bowels, as dropped upon the grass, come in contact with grazing animals, or those in which a diseased udder conveys the malady to calves.

Prof. Walley, of Edinburgh, is so pronounced in his views as to say that a tuberculous animal is "useless for breeding, dangerous for dairy purposes, valueless and dangerous as a companion, and its flesh nocuous for human food," and so claims that our whole energy should be directed, not to curing an animal, but to preventing the disease.

Prof. Williams, speaking of those cases in which the tubercular deposits have become masses, says that they are to be viewed as excrescences, and if they are carefully removed and the membranes and

structures in which they are imbedded and from which they grow are carefully dissected from them, the flesh is perfectly good. Others insist that all such flesh shall only be used after thorough cooking. The question as to the use of the milk has been made to depend much upon the condition of the udder, and upon the presence or absence of tuberculous deposit in it. This is often hard to determine until after death. It is also difficult to see how, in a cow greatly affected in the alimentary canal or in the lungs by a constitutional disease, such a secretion can remain pure. It is now believed by many physicians that the uncooked milk from tuberculous cows is a frequent cause of tuberculosis, and especially of mesenteric tuberculosis, in children.

For the prevention of tuberculous disease in animals, the following good rules are given:

"1. All flesh and offal of affected animals, especially in the advanced stages of the disease, should be destroyed.

"2. All suspected animals should be carefully isolated until pathogonomonic signs or tests have become developed.

"3. All actually affected animals should be slaughtered.

"4. All contaminated food, litter, &c., should be disinfected or burned.

"5. All infected houses should be disinfected.

"6. No animal, whose history is tainted even in the slightest degree, or in whose system there exists the least suspicion of tubercle, should be used for breeding purposes.

"7. Great care should be exercised at the period of birth to avoid any influences which will weaken the tissues in adultism.

"8. Breeding animals should be carefully shielded—as far as is practicable—against debilitating influences of any kind.

"9. The system of feeding and general management of our high-class stocks should be regulated on a more rational and conservative basis than that on which it at present rests."

The treatment of an animal suspected of tuberculosis, and yet not so affected as to be of no value, should aim at fattening. If the muscular tissues are, to all appearances, healthy, as tubercle is never, as a rule, developed in such tissue, it is not to be rejected as food simply on the fact that masses are found in the abdominal cavity, or that the lungs or glands are diseased. There seems to be stronger evidence that the uncooked milk of animals suspected of tuberculosis should not be used. Yet if there is no tubercle in the udder, there are those who still claim that the milk is not to be condemned.

The fact that tuberculosis in cattle is admitted to be largely on the increase in Europe, in Great Britain and in this country, and that it is an outcome of forced and unsanitary methods, and is especially prevalent among high-bred and pampered stock, should lead all stock raisers to a closer watchfulness over the laws of health which pertain to cattle, not less than to human kind. Pure air, pure water, cleanliness of skin, good bedding, proper food and exercise, and special attention to milch cows, is essential to the preservation of the health of herds.

NOTE.—All those circulars as to Contagious Diseases of animals, will soon be printed together, as Circular L., and can be had on application, by postal, to the State Board of Health, Trenton.

LAWS.

The chief laws relating to health passed by the Legislature of 1884 are as follows:

Chapter XXIV.—An act to provide for drainage and sewage in densely-populated districts in which there is a water-supply.

Chapter XLIX.—Supplement to an act entitled "An act to prevent the spread of glanders in horses."

Chapter XC.—A supplement to an act entitled "An act to prevent the adulteration and regulate the sale of milk."

Chapter CXXXVII.—A supplement to an act entitled "An act to limit the age and employment hours of labor of children," etc.

Chapter CLX.—A further supplement to an act entitled "An act concerning the protection of the public health."

Full references to former laws will be found in the Sixth Report, pp. 255–260, and the Seventh Report, pp. 31 and 32.

As throwing additional light on the interpretation of the health laws of this State, and upon the right and the duty of summary authority in so great an interest as the protection of the public health, we are glad to be able to furnish the text of the recent charge of Justice E. W. Scudder, of the Supreme Court, in the case of Hyers *v.* Cole and others:

Gentlemen of the Jury—The plaintiff in this action has brought a suit against five different parties for alleged assault upon him, followed by arrest and imprisonment in the lock-up, at Asbury Park. This, it is alleged, took place on the 14th day of September, 1883, and he claims large damages of these defendants for the injury which he has sustained at their hands. The particulars of the occurrence are given by the parties and their witnesses, and the first question for the court and jury to determine, relates to the legal rights of the Board of Health and the police of Asbury Park; their right to inspect premises, and their right to arrest for breaches of the peace.

I do not intend to examine these laws and ordinances at this time critically; it might only embarrass you in the considerations of the facts in this case. It is the duty of the court to tell the jury what the law is, and then it is the jury's duty to apply the facts to the law.

After an examination, in the short time I have had, of the charter of Asbury Park, the laws of our State relating to Health Boards, the ordinances of the commissioners or council of Asbury Park, my conclusion is, that the health officers duly appointed, as these appear to have been, under the charter and ordinances, and the laws of our State, had the right to inspect premises, houses and lands adjoining residences in that place. I do not say what further they can do under the charter and ordinances and laws, but they had the right to inspect premises that they might base upon that inspection some action for the abatement of the nuisances, if they existed. In doing this, the inspector, whoever he may be, appointed under the charter and ordinances, must act upon reasonable cause, and that seems to me is the great guard in this case. We have heard much about officers going into people's houses and examining from mere curiosity, as an abuse of private rights, but that is not the question. The question now is, whether a man acting under public authority, duly clothed with the power of the law, has a right to make an inspection where there is reasonable cause to believe a nuisance exists. Whether there is a reasonable cause or not, is, of course, a question of fact for the jury. That is the fundamental point that lies at the basis of this action, whether they had reasonable cause to believe that there was a nuisance affecting public health upon those premises, and whether they made their examination in a reasonable way.

There is another rule of law that is fundamental to these proceedings, and that is this: when an attempt is made to enter upon a man's

premises, officers must make known to him their authority, and why they are there. Any one would resent a stranger entering upon his property and examining his premises, but if he came to you saying, "I am an officer of the law; I have reason to believe, unwittingly perhaps, you have something on your premises that is injuring the health of your family and in that way may spread in the neighborhood and do harm; I am here as a public officer to make the necessary examination; here is the badge of my office, and this is my purpose." A good citizen under these circumstances should not resist the officer and say: "You have no right here," and order him off, but would say, "For the sake of my family and my neighbors, I am willing to submit and give up some of my legal rights in this matter." There are these two points, therefore, to be determined: first, whether there is reasonable cause for the examination, and second, whether he makes known to the party the reason of his official visit. The Health Board law requires that he shall wear the "health badge." Mr. Cole testifies that he had it upon him at the time he entered the plaintiff's premises. The plaintiff says he did not see anything of the kind. It may have been there, nevertheless, if he did not see it. These badges are worn on the breast, where they can readily be seen, or if the plaintiff had asked to see his badge of office, it might have been shown, but he asked for a paper, as if he expected some warrant to make the examination; but he was not bound to show him any warrant merely to make an examination; he had not come there to remove the nuisance, but he came as an inspector, as he has testified.

Another rule applicable to this case is this, that in making this inspection the officer must use no unnecessary force himself; and if he goes there with a power and purpose to examine and see whether there is anything wrong, he must go with the manner of a man who has a duty to perform, and not to insult and annoy. He must use no unnecessary force or violence. If, however, he is resisted in a fair examination of the premises, I think he may go as far as it may be necessary to overcome opposition, in order to discharge his public duty. The more perverseness there is in the man opposing him, the greater may be his reason to believe there is something wrong. The Inspector says he saw a heap of manure and it was covered with offensive matter, as he and Dr. Mitchell say, with maggots feeding upon something likely to breed disease. He went to the nearest door and found a man there who, when spoken to, flew into a rage and ordered him off the premises. It would be most natural to suspect, under these facts, that he had something to do with it. Why should a man be so indignant if he were innocent? All he had to do was to say that he had nothing to do with it, in a quiet way, and then, if the officer insisted upon an examination, in the discharge of his duty, it was his duty to answer his inquiries and submit to a proper examination. The officer could insist, in a respectful way, on seeing whether it came from his house. The question then was, whether there was reasonable cause to suspect

there was some nuisance there, and that it was traceable, according to the conduct of this man, to his own premises. He says he had been making root beer of some kind in his house. If the officer knew that, and he says he had heard it, it was natural for him to suppose that this refuse that he saw on the manure heap might come from that; although the plaintiff denied it, he was not bound to believe that, therefore he went in to make the inspection.

Now, so far, in looking at the ordinances, the laws and the charter, I think there was power, at least, for the officer to inspect those premises if he had a reasonable cause to believe that there was a nuisance of some kind there, likely to breed disease. You will find in the charter of 1874 quite a general power. It says: "The said commissioners (that is, the governing body of Asbury Park,) shall have power to appoint a police justice and police officers sufficient for the preservation of order, and determine the compensation they shall receive, and to suppress any nuisance, to make and enforce all necessary sanitary regulations." That is a very general power. They can "make and enforce all necessary sanitary regulations;" that is, regulations necessary to preserve the good health of that borough. The act of 1880, which has been referred to, says: "The Board of Health of any city, borough, incorporated town or township, shall examine into all nuisances, foul or noxious odors, gases or vapors, or causes of ill health or disease that may be known to them." The Board of Health may examine into all nuisances that may be known to them. They of course may make inspection; they may appoint officers to examine; it is not to be supposed that the Board itself is to examine all parts of the town; they appoint their proper officers to do it, and in this case they appointed health inspectors. In that way the Board of Health examined into all nuisances as all official bodies do. They act by committees and special officers, who are delegated to certain ministerial duties, and so the Board of Health, in this case, although they did not all go to examine these premises, yet, acting under this law and their ordinances, they had appointed health inspectors to examine into all nuisances. "The Board of Health shall examine into all nuisances that may be known to them or be certified to them," the law says. As this officer passed along the street, or the alley, he noticed this place, he says; he was an officer of the Board, not a mere intruder, or stranger, and he was acting for the Board and by their authority; he was looking into this matter and beginning to make his inquiries about it. And so as to other particulars, in going through the laws, although they are somewhat confused, the general conclusion that I have reached is that the inspector had the right to examine and see whether there was a nuisance upon the premises. The question for you is, whether he exercised that right properly. It is said that the officer must find the owner, or the occupant of the property, where it exists. Well, accept that as the law, was not the plaintiff in this case the occupant of those premises? He occupied a portion of the building in front of this land where the manure-heap

was found, and, finding the door open, the inspector went to make inquiry. He may be said to be the occupant, as far as the public are concerned. There may have been other occupants, having the right to use this yard for certain purposes, but the inquiry was addressed to a proper person. At the first visit made by Mr. Cole, finding what he says, he entered or attempted to enter the house when the door was open, saw the plaintiff, and made his inquiry of him. The plaintiff said he had nothing to do with it; that it belonged to others, and it ended in his ordering the officer to go away from the house. Mr. Cole says at that conversation he used some pretty high language in reference to the Board of Health, as to their authority to come there. After Mr. Cole left, he went to the president of the Board. One of the ordinances of 1880, which has been read, authorizes the president to act, when the Board is not in session, and between their meetings he has the power to give orders. He did not convene the Board, and you can see that could not conveniently be done; to call all the members together whenever there was a case directly in view under inspection would nullify the whole law. The Board had given authority to the president to act between their meetings, and this inspector went to the president, who, by the ordinance of 1880, was acting for the Board when not in session. The president of the Board went with him to this place. They testified that they went together and examined the place where it was alleged this difficulty was found. You have heard the testimony of Dr. Mitchell of what he found there. After this examination, they went to the house and there saw the plaintiff; and Dr. Mitchell testifies, and Mr. Cole also, that they spoke to him of the nature of this offensive matter, and offered, if he would furnish a barrel, that they would have it removed. That was the first remedy they proposed. He refused to do anything, according to their evidence, and that induced Dr. Mitchell to make further examination, and in looking around the house he found some indications that induced him to believe that the origin of this trouble was in the house. He may have been mistaken about that, but as I have said, you are to say whether they were acting upon probable cause in making this examination and in going to this house. He testifies that he saw upon the ground near the house indications of something that was not right—something offensive and that led him to desire an admittance to the house. You will recollect also that these officers, acting as they did, had this further cause to believe there was something wrong, and that the plaintiff was the origin or cause of it, because Mr. Cole testified that in his first interview with Mr. Hyers he told him that he threw this offal out there himself. This is denied by Mr. Hyers, and it is not said that upon their second visit he made any such admission; it stands, therefore, upon Mr. Cole's testimony alone. If that be true, and these officers went there with that knowledge, they had some cause, at least, to look to him and to his premises for the reason. The cause might be, as has been intimated, the man-

ufacture of beer or something of that kind inside, which the plaintiff now admits that he was doing. He says that it was root-beer, that he got the ingredients from New York and there was no offensive refuse from it. If that fact was known to these officers and they saw this offal outside, was it a reasonable cause for them to examine the premises? The president, Dr. Mitchell, says they told him who they were and the purpose of their visit, but he resisted and objected to any examination being made; flatly denied that he had anything to do with this offal outside and stood upon his rights; said his house was his and nobody could go into it. If that be so, then we might as well abolish all Boards of Health. If a man's contradiction is to stand against an officer's inspection of what they see and what they say he admitted; if his refusal is to stand in opposition to the law, our Boards of Health can act upon nothing except what can be seen outside the house. The great cause of disease may be inside a man's dwelling and he may be utterly unconscious of it, and if the officers come to him, stating their purpose in a peaceable way, and ask leave to make their examination, I doubt very much whether his house, under those circumstances, can be considered his castle, when the law, in express terms, authorizes an examination to be made. They entered his house, as they say, and began the examination; he objected to it; of course we must assume that, from all they say. He says distinctly that he told them to go out, when they came in the house; and then his version is that they got hold of him and took him out; that he demanded a paper authorizing them to make the search, and they said they had none. He says they used violence, and all that he did was to hold back; but he did not strike them or resist them in any way, except by holding back. When he was outside he says that Mr. Cole threw him down and held him there until these other defendants came and took him off to the lock-up.

On the other hand, the statement is this: That Dr. Mitchell and Mr. Cole entered the house for the purpose of making an inspection based on what they had seen outside, and that Mr. Cole went upon one side of the room to make an examination into a barrel, and while the doctor was looking upon the other side of the room, and as Mr. Cole was stooping over the barrel, he saw the plaintiff, Mr. Hyers, strike Mr. Cole violently on the side of the head with his fist, and, as he recovered from it, kicked him in a painful part of his person. If this statement be true and believed by you (and Mr. Cole and Dr. Mitchell say it is so), whether these defendants had any right to these premises or not, he is guilty of an assault and battery for which they had a right to arrest him. There is no law in this State that justifies a man in striking and kicking a person who is a mere trespasser upon his land. It is greater force than is necessary under the circumstances. Your first right is to order a trespasser off your lands. If he refuses, and resists and strikes you, you may strike him back—using just as much force as is necessary to resist force—and remove

him from your premises. Admitting that these gentlemen had no right there, but Mr. Cole and Dr. Mitchell had mistaken their duty and went outside of the ordinances and laws, and that they came into the man's house when he did not want them there, he could order them out, but he had no right to strike Mr. Cole as he did—he became a trespasser himself in doing so and committed an assault and battery. It is your province, not mine, to weigh this testimony. He says he did not strike them at all, but they dragged him out. They say when he committed this assault, Dr. Mitchell said to Mr. Cole, "Arrest him," and he, being also a police officer of Asbury Park, did so. If he was a peace officer, acting as such, he had a right to make the arrest when he saw the assault committed, without a warrant. Dr. Mitchell testifies as to the resistance he made and the difficulty Mr. Cole had in keeping him; that he went to Mr. Bailey, the chief of police, and Mr. Buchanon, the chief commissioner of the borough, for assistance. If a man resists an arrest by an officer having authority to make it, others may assist him when called on. It is the duty of all good citizens to aid a police officer in making an arrest and in discharging his duty to the public. The persons who are joined as defendants in this case are Mr. Cole, Dr. Mitchell. Mr. Buchanon, the commissioner, Mr. Bailey, the chief of police, and Mr. Buckalew, who was a police officer and called upon by the chief of the police to assist in making the arrest, who assert that they were justified by the resistance of the plaintiff. It is also testified that the plaintiff attempted an escape during the time they were trying to arrest him. He, it is said, asked permission to go in his house in order to put away some of his property, and after he had entered he locked the door. He says himself that he went in and locked the door and they came in after him. Mr. Buckalew, the constable, was ordered by the chief of police to re-arrest him, and he broke in the door, or forced it open, as he had a perfect right to do, if the plaintiff was attempting to escape. A man cannot shut his door, when arrested for crime, in the face of a public officer and put him at defiance. He may break in the house to make a criminal arrest. This was done, according to the evidence, by Buckalew, who entered the house and with help took the plaintiff to the lock-up. No magistrate being found immediately, he was put in a safe place until they found one; then he was examined, and after examination bail was taken for his appearance to answer for the offence. A man under arrest is entitled to a speedy examination so it can be determined by the proper magistrate whether he has committed a crime that will justify holding him to bail. The nearest magistrate, it is said, was found without unnecessary delay; the examination took place and he was admitted to bail.

The testimony of the respective parties is conflicting. The plaintiff insists that here has been an outrageous violation of his rights by coming into his house, arresting him and locking him up without legal cause. On the other side it is claimed that they were acting in

the interest of the public, the enforcement of the laws of the Board of Health, and the whole difficulty arose from the plaintiff's unlawful resistance, the violence of his attack upon Mr. Cole, and that was the cause of their subsequent treatment of him in locking him up in the public place kept for that purpose.

The great importance of this question, of course, is in construing the power of the health officers under the charter, laws and ordinances, which is a question of law; the manner in which they execute them is a question for the jury, depending on the facts of the case. We are not to speculate on other cases, but ascertain what was done in this case by these particular parties. It is said that it is a great outrage to private rights if a man's house is searched by public officers, appointed by the law, without warrant or accusation of crime. This power, when lawfully exercised, is based on and justified by the law of public necessity and it is part of the police power of our State, sometimes exercised when it becomes necessary to deal summarily with abuses and dangers for great public ends. In case of fire, houses are not only entered but they are blown up and destroyed to stop the spread of a great conflagration—that the whole town or city may not be burned down and hundreds rendered homeless and impoverished. When great ends are to be accomplished for the public safety and for public health, the Legislature sometimes delegates part of the police power of the State to municipal bodies or selected persons, whose right is undoubted, provided they act in accordance with the law and in a fair and reasonable manner. If the acts complained of were done by these defendants in an arbitrary way, by asserting their authority because they happened to be officers of the borough, and overpowering and oppressing the plaintiff without legal excuse, then they should be punished; but if, on the other hand, they used a reasonable discretion and acted as prudent men in the discharge of their duty, there is no liability at all; they should be commended rather than condemned. These are the principal points of the case which are submitted to you, and I will allow the counsel any exception to the construction which has been put upon the law and the ordinances.

The jury found the defendants not guilty.

MEDICAL REGISTRY.

The seventh report of this Board, 1883, contained a list of all names returned to us of medical practitioners in this State, who had registered in the clerk's office of their respective counties, under "An act to regulate the practice of medicine and surgery, approved March 12th, 1881, and the supplement thereto," approved March 22d, 1883. By this act no person is allowed to practice medicine or surgery in this State in any of their branches for gain, or to receive or accept any fee or reward, directly or indirectly, unless having the title of M. D., and having recorded a diploma, or, in case of twenty years' practice, a certificate thereof, in the office of the county clerk of the county. This large registry is to be found in the seventh report. The list herewith given is the addition sent by each county clerk of the registries since the last report, with the addition of a few who have requested a correction of some error in the former list. Especially in Camden county list, Pennsylvania University is sometimes confounded with University of Pennsylvania. While the whole list cannot be repeated each year, effort is made to obtain knowledge of all local changes. The lists furnished this year are as follows:

ATLANTIC COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
North, James	Hammonton	—— —, '68	Jefferson Med. College, Phila.
Parkhurst, G. H.		Mar. 3, '60	
Way, Jacob H.	Atlantic City	Mar. 12, '75	Hahneman College, Phila.
Nivison, Mrs. S. S.	Hammonton	Mar. 10, '85	Female Med. College, Phila.
Marvel, Philip	Atlantic City	May 1, '84	University of Penna., Phila.
Elmer, Ulrich	Egg Harbor City	Feb. 24, '83	University of France.
West, Maximilian	Atlantic City	Mar. 12, '75	University of Penna., Phila.
Merritt, David		Mar. 6, '51	Penna. Col. of Gettysburg.

BERGEN COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Adams, Charles Francis...	Hackensack	Mar. —, '84	N.Y. Hom. College, N.Y.City.
Ballard, James J............	Tenafly................	Mar. 9, '82	University of N.Y., N Y.City.
DeYoe, Charles P..........	Ramsey...............	Mar. 15, '83	Maryland Acad'y, Baltimore.
Howard, C. I................	Lyndhurst	Mar. 4, '84	Col. of Phy. and Surg. of Md.
Parsell, Lewis B............	Closter...............	June 14, '81	L. I. College, Brooklyn, N.Y.
Terry, J. Wadsworth......	Englewood	July 30, '62	Yale College, N. Haven. Conn.

BURLINGTON COUNTY.

Beegle, Isaac N. Fitch...	Ocean Grove.......	Mar. 1, '70	Bellevue Hospital, N. Y.
Brown, Richard E.........	Mount Holly.......	Mar. 10, '63	Jefferson Med. College, Phila.
Campbell, Robert A.......	Burlington	Mar. 12, '75	St. Louis Medical College.
*Haines, A. C..............	Columbus............	Mar. 8, '80	....
Harker, Charles............	....	Mar. 29, '84	Jefferson Med. College, Phila.
Jones, Gilbert Eli.........	Mount Holly.......	Nov. —, '71	Dartmouth College, America.
Jenkins, Mozart............	....	July 6, '84	University of Vermont.
Jackson, Moses Jose......	....	—— —, '84	Eclectic College.
Kollock, M. Henry........	....	Feb. 21, '69	University of Pennsylvania
Tolson, B. Franklin......	Masonville..........	Mar. 9, '72	Jefferson Med. College, Phila.
Waln, I. Byers..............	....	Mar. 29, '84	Jefferson Med. College, Phila.
Young, D. Irene..........	....	Mar. 7, '48	Pennsylvania College, Phila

*In the case of A. C. Haines, the register gives date of filing 1880, but diploma cannot be found.

CAMDEN COUNTY.

Wills, Joseph H............	....	Mar. 15, '80	Pennsylvania University.
Archibald, Henry C.......	....	....	Pennsylvania University.
Shafer, William............	....	....	Jefferson College.
Theis, Wilhelm.............	....	Mar. 10, '77	Jefferson College.
Townsend, E. P............	....	Mar. 10, '63	Jefferson College.
Wells, Jesses J..............	....	....	Jefferson College.
Marvel, Philip..............	....	....	Pennsylvania University.
Diekel, John G..............	....	June 25, '69	Eclectic College.
Raughley, Gulielnum.....	....	....	University of Pennsylvania.
Finlaw, James P............	....	Mar. 3, '84	Electric Med. College, N. Y.
Somerville, G H	....	....	Hahneman College

CAPE MAY COUNTY.

Patterson, Austin H......	Ocean City.........	Mar. 1, '73	University of the City of N.Y.
Gardiner, William H......	Philadelphia, Pa...	Mar. 10, '79	Hahneman Med. Col. of Phila.
Kirkpatrick, Andrew B..	Cape May Point...	Mar. 29, '84	Jefferson Med. Col., Phila., Pa.

CUMBERLAND COUNTY.

NAME OF PHYSICIAN.	P. O ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Ayars, Sherman Edwin..	1113 Girard St., Phila.	Mar. 3, '84	Eclectic Med. Col, N.Y. City.
Adams, O. H	Vineland	Nov. 13, '83	Dartmouth College.
Bidwell, Edwin C	Vineland	Jan. 20, '44	Yale College, N. Haven, Conn.
Bidwell, Edwin H	Vineland	Apr. 3, '83	University of Penna., Phila.
Brewer, Charles	Vineland	Mar. 6, '55	University of Md., Baltimore.
Harris, George M	Dorchester	Mar. —, '81	Eclectic Med. Col. of N.Y.
Jones, Eli G	Bridgeton	Nov. 1, '71	Dartmouth College, N. H.
Wilson, Howard A	Deerfield	Mar. 29, '84	Jefferson Med. Col., of Phila.
Wade, John W	Millville	Mar. 29, '84	Jefferson Med Col, of Phila.
Moore, John H	Bridgeton	Mar. 15, '80	University of Penna., Phila.

ESSEX COUNTY.

Crane, Jr., Matthias		Feb. 27, '78	Columbus Col. of Med., Ohio
Carroll, William E		May 13, '84	Columbia Col. of Med. and Surg.
Duffy, Charles J		May 13, '83	Columbia College.
Dewey, Raphael Pelham.		June 20, '70	Philadelphia College.
Everitt, Edward		Mar. —, '79	N. Y. Hom. Med Col.
Harrington, Rich. Chas...		Mar. 13, '84	Bellevue Hos. Med. Col., N.Y.
Johnson, Jotham Clark...		Sept. 21, '82	Col. of Phy. and Surg., N.Y.
Jones, Eli Goellet		Nov. 1, '71	Dartmouth Med. Col, N. H.
Mueller, Edward		Aug. —, '83	Med. Society of New Jersey.
Newman, Emanuel D		Sept. 30, '84	Col. of Phy. and Surg., N. Y.
Phelan, Thomas Francis..		Mar. —, '82	Bellevue Hos. Med. Col., N.Y.
Roth, Jr., Philip		July 9, '84	University of Vermont.
Snyder, Mrs. A		——, '83	University of Leipzig.
Sealy, Edward		Mar. 13, '84	Bellevue Hos. Med. Col.
Slight, Berier Has. B		Mar. 14, '82	Hahneman Med. Col., Phila.
Van Busker, Roswell		Jan. 8, '84	Affidavit of 20 years' practice.
Wright, Benjamin M		Oct. —, '69	Hosocamii Ins. Lan. College.

GLOUCESTER COUNTY.

Philips, Cyrus B		Mar. 1, '82	Academy of Maryland.
Weeks, Charles B	Mantua	Mar. 30, '83	Jefferson Medical College.
Currie, Margaret	Bridgeport		United States Med. College.
Tuller, Malcolm B	Woodbury	Mar. 10, '73	Hahneman Med. Col., Phila.
Beckman, Oswald H	Clarkston	Mar. 29, '84	Jefferson Med. College, Phila.
Speakman, Howard D	Woodbury	Mar 1, '—	University of Penn., Phila.

HUDSON COUNTY.

Adam, Clovis		Mar. 1, '77	Columbia College, N. Y.
Baker, Jane M		Mar. 11, '82	Eclectic Med. Col. of N. Y.
Briggs, James E		Feb. 4, '75	Eclectic Med Col. of N. Y.
Brown, Cecelia A		Mar. 8, '82	Hom. Med. College, N. Y.
Cornell, G. B.		Mar. 4, '64	University of City of N Y.
Carpenter, B. D		——, '46	University of City of N. Y.

HUDSON COUNTY—Continued.

NAME OF PHYSICIAN.	P. O ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Corwin, Fred. Miller		Mar. 8, '81	University of City of N. Y.
Drain, John S		Mar. 5, '84	University of City of N. Y.
Duszowski, Henry W		Mar. 6, '79	Eclectic Med. Col. of N. Y.
Darlington, Wm. L		Mar. 11, '75	Jefferson Med. Col., Phila.
Freeman, Aurry		Mar. 13, '84	Bellevue Hosp. Med. College.
Finnerty, John Henry		Mar. 13, '84	Bellevue Hosp. Med. College.
Finch, R. G. D		Mar. 8, '81	University of City of N. Y.
Hopper, C. Percy		Mar. 15, '83	Hom. Med. Col., N. Y. City.
Hoegelsberger, H		Mar. 5, '84	University of City of N. Y.
Healy, Dennis J		Mar. 13, '80	University of City of N Y.
Jackel, Charles E		Mar. 13, '84	Hom. Med. College, N. Y.
Jones, Wm. Fred		July 7, '83	University of Vermont.
Loomis, Albert J		Sept. 1, '84	Bellevue Hosp. Med. College.
Luck, John T		Feb. 28, '68	Columbia College, N. Y.
Lutz, Fred. H		Mar. 16, '82	Hom. Med. College, N. Y.
Majonka, Eleanor		Jan. 23, '80	Danzig Inst of Midwifery.
McKenzie, Wm. V		May 13, '84	University of Pennsylvania.
Pindar, John		April 4, '53	University of Pennsylvania.
Russell, Jr., Wm. H		Mar. 10, '77	University of City of N. Y.
Reed, John W		July 9, '84	University of Vermont.
Rosenkrans, James H		Mar. 14, '83	Bellevue Hosp. Med. College.
Rhodes, T. C		Mar. 9, '65	University of City of N. Y.
Schmidt, Frederick		Aug.—, '70	Acad. of Geo. Augustus, Ger.
Senderling, P. M		Mar. 9, '56	University of Pennsylvania.
Tompkins, Abraham W		Mar. 1, '83	Eclectic Med Col. of N. Y.
Van Derback, John		July 20, '66	Griefswold Univ., Prussia.
Wilkinson, James		Oct. 14, '58	University State of N. Y.
Warden, Albert W		Mar. 13, '80	University of City of N. Y.
Warke, D		Mar. 9, '65	University of City of N. Y.
Wilkinson, George		July 15, '83	Bellevue Hosp. Med. College.
Youlin, J. J		Mar. 1, '54	Hom. Med. Col, Cleveland.
Yarnall, J. H		Mar. 1, '83	Eclectic Med. Col. of N. Y.

HUNTERDON COUNTY.

Funey, William F	Frenchtown	Mar. 12, '74	University of Penna, Phila.
Anderson, J. E	Stanton	Mar. 4, '84	Col. of Phys. and Surg., Balt.
Warrington, C. B	Clinton	Mar. 5, '60	University of Penna., Phila.

MERCER COUNTY.

Sands, Oscar Gilbert			Bellevue Hosp. Med. Col.
Schicht, Emilie		Aug. 29, '68	Karl Ferdinands Univ. in Könegreiche Böhmen.
Wetherill, Horace G	Trenton, N. J		University of Pennsylvania.

MIDDLESEX COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Applegate, Grover T......	New Brunswick...	Mar., '83	Hahneman Med.Col.Chicago.
Baldwin, Abram V. N....	New Brunswick...	Mar. 16, '82	Col. of Phys. and Surg., N. Y.
Carroll, Edgar............	....	Mar. 10, '80	Jefferson Med. Col., Penna.
Dewey, Raphael P.........	(Traveling Phys.)	June 20, '70	Eclectic Med. Col., Penna.
Davis, Francis A...........	Spotswood..........	Mar. 1, '71	Bellevue Med. College, N. Y.
Davis, Edwin T...........	Sayreville	Mar. 14, '82	Hahneman Med. Col., Phila.
Janeway, Thomas L......	New Brunswick...	Mar. 12, '67	Col. Phys. and Surg., N. Y.
Jones, Eli Grellett.........	(Traveling Phys.)	Nov. 1, '71	Dartmouth Medical College.
Leonard, Franklin A.....	Milltown............	July 9, '84	University of Vermont.
Lewis, Smith H............	South Amboy......	Mar. 14, '81	University of Pennsylvania.
Snyder, S. M...............	Spotswood..........	Mar. 11, '64	University of Pennsylvania.

MONMOUTH COUNTY.

Andrew, Russell G.........	Navesink............	Jan. 9, '66	Col. of Medicine, of Albany.
Bennett, Henry A.........	....	Sep. —, '83	University of Vermont.
Barr, David M..............	Ocean Grove........	Mar. 10, '84	Jefferson College, Pa.
Christine, William B......	Asbury Park........	Mar. 12, '77	University of Pennsylvania.
Cooper, James E...........	Colts Neck.	Mar. 12, '67	Columbia College.
Curtis, D. Farquhar	Long Branch......	Mar. 10, '81	Columbia College.
Disbrow, Stephen M.......	Farmingdale.......	Nov. 13, '66	Columbia College.
Ford, Edward J............	Asbury Park.......	Mar. 1, '60	Col. of Phys. and Surg., N. Y.
Follett, William M.........	....	Mar. 1, '83	Eclectic Med. College, N. Y.
Higgins, Archibald A.....	Manasquan.........	Apr. 1, '54	University of Pennsylvania.
Hepburn, G M	Freehold	Mar. 10, '80	University of Pennsylvania.
Haines, Alfred C...........	....	Mar. 31, '43	University of Pennsylvania.
Jones, Eli G.................	....	Nov. 1, '71	Dartmouth College.
Johnson, William E.......	....	Feb. 22, '66	Cincinnati College.
Johnson, William M......	....	June 30, '81	University of Michigan.
Kent, William..............	....	June 6, '37	Collegii Hosocomii, Brooklyn
Kirkbride, M. Frank......	....	Mar. 22, '74	University of Pennsylvania.
Lytle, Richard Ridgeley..	....	June 28, '77	University of Virginia.
Leonard, F. A..............	....	July 9, '80	Univ. of Vermont Agr. Col.
Morris, Henry..............	....	Mar. 12, '78	Jefferson College, Pa
Nagle, J. E	... .	June 16, '52	University of Vermont.
Pumyea, Peter B.........	Allentown	Mar. 1, '68	Bellevue Medical College.
Rankin, E. G.............	....	——, '78	New York Medical College.
Socarras, de Rodolfo......	....	Mar. 15, '82	Bellevue Hosp. Med. Col.
Slocum Sidney T..........	Asbury Park.......	July 16, '84	New Jersey State Dent. Soc.
Urie, William A...........	....	Mar. 10, '79	Electropathic Inst., Phila.
Vansant, Eugene L........	....	Mar. 29, '84	Jefferson College, Phila.
Woodman, Johannum.....	....	Mar. 15, '8[illegible]	Columbia College.
Wainwright, James B.....	Manasquan.........	Mar. 1, '77	Columbia College.

MORRIS COUNTY.

Ayers, Daniel S............	Rockaway	Mar. 2, '70	Columbia College, N. Y. City.
Ayers, J. S..................	Madison	Mar. 15, '83	Hom. Med. College, N. Y.
Bright, Leonard...........	Woodpost...........	....	University of Vermont.
Dodge, H N...............	Morristown.........	Feb. —, '68	Columbia College, N. Y.
Parker, W. Thornton......	Morristown........	....	....
Reid, S. H................	Madison	—— —, '81	Columbia College, N. Y.
Salmon, Johanna	Boonton	Sept. 13, '79	Prov. Nurs'y Inst., Germany.
Simon, Charles I...........	Boonton	—— —, '79	Columbia College, N. Y.
Woodruff, Marietta C.....	Boonton	Sept. 29, '75	N. Y. Free Med. Col. Women.

OCEAN COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Badger, Merritt O	Manchester	July 9, '81	Univ. Urbis Neo Eboraci.
Bradford, T. Hewson	Berkeley	Mar. 3, '74	Collegii Jeffersoniensis.
Bennett, Henry Allyn	Point Pleasant	....	Collegii Agricultural.
Huntsinger, Edward	Toms River	Oct. 16, '68	University of Pennsylvania.
Taylor, John M	Beach Haven	Oct. 7, —	University of Pennsylvania.

PASSAIC COUNTY.

Griffiths, John L	Paterson	June 9, '84	University of Vermont.
Joussett, Albert D	Paterson	Mar. 14, '83	Bellevue Hosp, Med. Col.
Millspaugh, Lewis C	Paterson	Mar. 5, '84	Univ. of the City of N. Y.
Millspaugh, Daniel T	Paterson	Mar. 5, '84	Univ. of the City of N. Y.
Van Riper, Cornelius	Passaic	Mar. 8, '66	Col. of Phys. and Surg., N. Y.

SALEM COUNTY.

Currie, Margaretta H	Woodstown	Mar. 6, '81	U. S. Medical College.
Jones, Eli Grellet	Salem	Nov. 1, '71	Dartmouth Medical College, Hanover, N. H.
Robinson, C. M	Elmer	Mar. 16, '62	University of Pennsylvania.

SOMERSET COUNTY.

Cooley, Justus H	....	Mar. 3, '84	Eclectic Medical Col., N. Y.
Jackson, Moses J	....	Mar. 1, '84	Eclectic Medical Col., N. Y.
Searls, Wellington B	....	Feb. 28, '72	Col. of Phys. and Surg., N. Y.
Hoagland, Garret G	....	Mar. 9, '84	Jefferson College, Phila., Pa.
West, Heston R	....	Mar. 19, '84	Hahneman Med. Col., Ill.
Voorhies, Amidee F	....	Apr. 7, '54	The Medical Society of N. J.
Stelle, Ephraimum M	Bernardsville	May 13, '84	Col. of Phys. and Surg., N. Y.

SUSSEX COUNTY.

Beers, Francis	Flatbrookville	Mar. 12, '81	Jeffersonian College, Penna.
Condit, Arthur W	Andover	June 29, '82	University of Michigan.
De Leon, Edwin	Orange Co., N. Y.	Oct. 17, '77	Eclec. Med. Soc. State of N. Y.
Huston, O. P	Flatbrookville	June 27, '78	University of Michigan.

UNION COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Armstrong, George A	Elizabeth	——, '84	Univ. of the City of N. Y.
Bull, Charles G	Plainfield	Mar. 10, '81	Bellevue Hosp. Med. Col.
Bachelor, H. M	Summit	——, '77	University of New York.
Davis, Thomas S	......	Apr. 2, '84	Hahneman Med. Col., Phila.
Donovan, Alfred Q	Elizabeth	Mar. 25, '82	Bellevue Medical College.
Griffin, J. F	Plainfield	....	....
Gale, William	Westfield	June 26, '67	Long Island Col. Hosp.
Hedges, Elias Walton	Plainfield	Apr. 13, '83	University of Pennsylvania.
Jones, Eli Grellet	Elizabeth	Nov. 1, '71	Dartmouth Col., N. H.
Oliver, Allen H	Elizabeth	Mar. 25, '82	University of Pennsylvania.
Stites, Joseph Augustus	Linden	Mar. 1, '75	Bellevue Med. Col, N. Y.
Ulmer, Henrietta Young	Elizabeth	July 3, '84	College of Midwifery. N. Y.
Wheeler, James Albert	Elizabeth	Mar. 13, '84	Hom. Col. of Med., N.Y. City.
Wilson, Norton L	Roselle	Mar. 13, '84	Bellevue Hosp Med. Col.
Walker, John Evans	Elizabeth	——, '84	University of New York.

WARREN COUNTY.

Bowers, Jeremiah K	Washington	——, '73	American Univ. of Penna.
Bergen, E. J	Hope	——, '77	University of New York.
Deacon, T. Eayre	Phillipsburg	——, '84	Hahneman Med. Col, Phila.
Linaberry, Wm. L	Allamuchy	——, '83	Col Phys. and Surg., Chicago.
Roberts, D. Edgar	....	——, '83	Univ. of the City of N. Y.
Stiger, J. D	Delaware	——, '84	Col. of Phys. and Surg., Md.
West, Heston R	Phillipsburg	——, '84	Hahneman M. Col., Chicago.

REPORT

OF THE

BUREAU OF VITAL STATISTICS

OF THE

STATE OF NEW JERSEY

FOR THE

Statistical Year from July 1st, 1883, to July 1st, 1884,

WITH ADDITIONAL QUINQUENNIAL TABLES AND CLIMATOLOGY.

DEPARTMENT OF STATE.

TO HON. HENRY C. KELSEY, SECRETARY OF STATE.

By EZRA M. HUNT, M.D., Sc.D.,
Medical Superintendent of Vital Statistics.

INTRODUCTION TO THE REPORT ON VITAL STATISTICS.

The importance of vital statistics is so well recognized by all who understand their bearing, that it is now seldom necessary to explain the work begun in this State in 1838, and rendered more complete by recent laws.

Since political economy, social science and the study of population have come to be recognized as very essential factors of prosperity, not a few are getting closer insight into the work. It is a great concern of the State whether a proper guard is placed upon the conditions of marriage, whether the evidence of parents' consent to minors, of the reality of the ceremony, and of the competency of the parties to the contract, are established. The family is the essential unit of the State, because it is of all society. On it depends more for the State than upon any other of its institutions. The English requirement of notice of marriage, and the plans still adopted in some of the States and in the District of Columbia, did not arise from inquisitive officiousness, but from what both reason and experience had taught as to the concern which the State has in properly-considered and attested marriages. It is believed that the influence of the method of the Society of Friends and of our early laws on this subject has been very salutary, and help to account for the fact that the grounds for divorce and its frequency are not so commonplace in this State as in many others. The marriage certificate now furnished has, in addition to the blank, a certificate which the parties may be asked to sign, and which not only is valuable as a defense to the person performing the ceremony, but is also a proper guard to the parties.

The record of deaths not only serves to identify, but is the mildest form of certificate that the life of a human being has ceased and that there has been proper care exercised as to it. So long as one of the chief objects for which the State exists is the protection of human life,

such certificates are not incidental but essential to a proper conduct of social and civic administration. We have constant evidence of the salutary influence which the system has exerted upon that oversight of human life and its perils, which cannot be too carefully impressed upon citizens. Strange as it may seem, very many incline to be careless in the protection of life. The flagrant case which occurred in this State during the past year, as to the burial of twenty or more infants, is but an illustration of how far an act of great impropriety may take place without that reflection which is due to the sacredness of life and to the relation which each life bears to the State.

As the incident of birth is none the less real in its civic relations than that of marriage or death, and as we also need to know the age and character of the material on which the forces of disease are acting, this record comes in as essential to the other two.

As to all, it may now be said that we know of no one who has made a study of political and social economy, who does not realize that, for social as well as for legal purposes, there should be this uniform method of collecting the statistics so as to make them not only accessible but comparable with each other for statistical and sanitary purposes. While one who works in such a field has great reason for humility, by reason of the imperfections realized, yet he also has great reason for encouragement, since the imperfections decrease, and, even with them, the greatest guides and lights of social and sanitary progress have realized and exhibited their essential value.

The only rare and incidental friction that occurs is from the fact that an occasional physician or undertaker claims that he is rendering a service for which the State should award him some compensation. The first plea is that the State has no right to require this service of him, since it should be asked, if at all, from the family in which the death has occurred or from the parent of the child born.

The answer which other countries or States have seen fit to give to this is, that there are reciprocal duties always growing out of the relations between a government and its people, and that, in its supreme right, the State must decide from whom certain duties are to be asked and what duties these shall be. If it decides that, for the social and political welfare of the State, it is necessary that the State should have the information, it makes its own choice as to who shall impart it. Thus it asks of the head of the family the facts as to a census, or of

the farmer the number of sheep or cattle he has, while it passes by the teacher and does not ask the number of pupils in his district but gets the information in another way. It selects the person or persons from whom it is likely to get the most correct information, and that is always some person having essential relation to the case. If the State has the right to call on anybody, it has the right to make this choice. The fact of payment or non-payment does not determine the right of the State to exact the service, for, if the State has no right to command this and other services of a citizen because of his special relations and capacity for correct information, it has no right to make him impart the information because of the proffer of pay.

If, however, it is claimed that the State should offer compensation, the reply is:

1st. That the State necessarily requires many duties of its citizens for which they get compensation in a general way, and for which it does not give specific remuneration. It sends out its census blanks or property blanks, and proffers no pay for their infilling. It requires reports of business and incomes, if it deems such returns to be needful. It summons persons on jury without attempt at any adequate pay for their time. It compels able-bodied men, if called out by an officer, to aid him in arrest, if no police force is at hand, and detains innocent persons as witnesses, if the public good requires it. The law imposes many duties on citizens and classes of citizens without direct compensation, where such duties are not burdensome or where they grow out of the special relations the individual has come to bear to society or to the State. It is, of course, important that these duties should not be unduly multiplied, or that no one person should have exacted from him a variety of such special duties. But when it is remembered that professional life practically excuses the physician from all jury duty, and recognizes him as an expert to a degree that allows him some compensation for services rendered, it can scarcely be claimed that the requisition as to these returns is burdensome.

It is to be remembered that the laws as to vaccination, as well as the general guard over births and deaths, results in emoluments to the profession at large. Even the right to practice medicine at all in a State is not a right inherent to the individual, but has to do so intimately with the health of the people that it has always been regarded as special in its character.

So readily has the right of States to require these returns to be

made been conceded by the medical profession, that we know of but one case that has ever reached the Supreme Court, viz., the case of the State of Iowa *v.* D. M. Hamilton (1882). The opinion of the court was given by Justice Beck, and on this point is as follows:

"The statute requires the collection of statistics pertaining to the population of the State and the health of the people, which may impart information useful in the enactment of laws and valuable to science and the medical profession, to whom the people will look for remedies for disease and for means tending to preserve health. *The objects of the statute* are within the authority of the State, and may be attained in the exercise of its police power. Similar objects are contemplated by States requiring a census."

The same principles of law are well stated by Dorman B. Eaton, Esq., now of the Civil Service Commission, in an article on "Sanitary Legislation in England" (New York, 1872). Also, in a paper by O. W. Wight, M.D., counselor-at-law, Detroit (A. P. H. Asso., 1882); in an article by Thomas M. Cooley, LL. D., of the Supreme Court of Michigan, on "What can the law do for the health of the people?" and in the case of the State of West Virginia *v.* F. M. Dent, before the Supreme Court (Justice Green), as decided November 1st, 1884.

"If a legislature saw fit to make it a condition that practitioners of medicine should not practice without a stated license, for which they should pay a fee, they might do so, or they may make the simple and easier condition that they shall give certificates of death or birth, and be registered as physicians." The court, in the case of Bradley *v.* N. Y. & N. H. R. R. Co., 21 Conn. 306, plainly enunciates the principle which covers all these cases: "It is universally understood to be one of the implied and necessary conditions upon which men enter into society and form governments, that sacrifices must sometimes be required of individuals for the general benefit of the community for which they have no rightful claim to specific compensation." Our State has shown that it has not the least tendency to be exacting in this regard by the terms of the law as to certificates of marriage, birth and death. In cases where a Board of Health, on account of threatening contagion, sees fit also to require for a time a report of contagious diseases, it allows adequate compensation, and thus draws the line between a vital event and the incidents of sickness.

Formerly, it was required of ministers to register marriages in the

county clerk's office of the county of their residence, and to pay one shilling for the registry. The law has now been made the same for them as it is for physicians and undertakers.

But one complaint has reached us the last year—from a physician—who, while intelligent in other matters, plainly shows that he has not given the same deliberate study to political economy or to the reciprocal relations of the State and the citizen, that he has to the more technical and business study of his profession. We have greatly to thank the medical profession of the State for the earnestness with which, as a body, it has responded to the efforts in behalf of public health, and believe that the State documents on the subject, which are mailed to all physicians, have aided in developing this interest. It is one of the satisfactions of this service that we are so often able to answer the inquiries of physicians or to direct them to sources of exact information on topics concerning the physical welfare of the people.

On the part of ministers, justices of the peace and others who perform marriage ceremonies, the returns are mostly satisfactory. It is very important that no marriage should escape record. Small books are now provided, similar to those for death and birth record, which can be carried in the pocket when needed, while the stub serves to keep that record which needs to be retained by the person officiating. These prepared books can be had by ministers and physicians instead of the blanks in stub, by applying to the city registrar or assessor, or by a postal directed to this office.

REMARKS ON SOME OF THE SEMI-DECENNIAL TABLES OF THIS AND THE FORMER REPORT,

WITH A RECORD OF THE NATIONALITY OF THOSE MARRIED IN THE STATE.

The seventh annual report of the State Board of Health contains the fifth report of the medical superintendent of vital statistics, under the re-organized method of securing returns. In connection with it is given a condensed statement of certain facts as to marriages, births and deaths for the five years ending June 30th, 1843. Also the climatology of New Jersey for the same period, as registered at seven representative localities in the State.

A table as to marriages which could not be completed in time for the former report, is also contained in this report.

The design has been so to group figures for the last five years as to give a larger aggregate of vital facts as to our population. It is not possible to state all the vital facts as to every marriage, birth or death that occurs, since, in some cases, they are not known or given, and in others supplemental reports were too late to be analyzed with the others. But this does not affect the series of facts collected as to the large numbers, about which statistics in full have been furnished since. If a sufficiently large number of data, reaching over a sufficiently large number of years, are secured, it is safe to infer that what has been found true of many tens of thousands through a series of years, would also be equally true of any small fraction thereof, whose record has not been reported or secured.

While the yearly returns of marriages, births and deaths are of much value as considered yearly, yet it is always to be remembered that the general health of any locality is never to be inferred from the record of a single year; generally the population is not large enough

to make full deductions. This is especially true of all precincts having less population than ten thousand. Also, there may be temporary and incidental causes at work, or the outbreak of some sudden pestilence has caused the unusual mortality. Even as to marriages and births, accidental circumstances may give a variation from a usual standard for a single year. It is because the laws of nature are uniform, that when studied in their entirety and with large aggregations of facts and figures, errors balance each other or become such very minute decimals in the general calculation that the result of vital statistics have been found to afford safe guides as to sanitary conditions. We do not mean by this that tables for single years are not valuable. Where there is a variation from the usual semi-decennial or decimal death-rate, there is always need of inquiry to see if the variation can be accounted for. It is very desirable, too, that cities should not merely consider the bulk of their vital statistics, but that, as to marriages and births, they should consider these as occurring in native or in foreign populations, or amid different classes and occupations. As to deaths, that is an imperfectly governed city that cannot tell each house where a death has occurred for the last decade or more; what was the sickness; what the age and nationality of the person deceased, as also the ascertained or probable cause of sicknesses or deaths in that house, if the disease was a local or communicable one. Thus, even so soon as a single year, and sometimes in a single week, where there has been a sudden increase in the number of deaths, immediate attention has been so attracted thereto as that causes have been discovered and abated.

The quinquennial table, page 379 of the seventh report, gives a very near comparative estimate of vital conditions in the several counties and cities traversed. While returns are a little more dilatory in some sections than in others and there may be a few more supplements in one than in the other, the proportion is so very small as not even by partial fractions to disturb the comparison. As to births it can not be claimed that they furnish so approximate a return of the real facts as do marriages and deaths. While the proportion for the State for five years is 21.47 as against 19.63 of deaths, the real number is claimed to be much greater. We may take the cities of Paterson and Orange as a fair estimate of what the more complete returns are for cities. We find that the returns of these for the last five years are: Orange, 2,103 to a population of 13,207; Paterson, 7,145 to a population of 51,031. This gives a birth-rate for Orange of 27.66,

and for Paterson of 28, per 1,000. The birth-rate in twenty-eight large English towns (of an estimated population of eight and one-quarter millions of persons), for December, January and February of 1883–4, was 31.7, 34.9 and 35.3 per 1,000 respectively.

The brith-rate of the whole kingdom for the year 1882 is given as 33.7.

There are some reasons for believing that the birth-rate of this country is lower than that of England. Thus the birth-rate for Massachusetts for 1883 is 23.82 to 1,000 of estimated population.

Rhode Island, whose system of registration is quite complete, gives for 1882 a birth-rate of 24.7 per 1,000, which is a little ahead of its general average. Providence, with a population of 119,405, had for 1883 a birth-rate of 24.42 per 1,000. While our record for the last five years gave an average of 21.47 per 1,000, as the returns have shown, a yearly increase, and as a delay in returns makes the percentage less than it really is, 22 may be stated as the average return for the State.

As is usual, the returns for cities exceed those for the country, although in the operation of our State law, by reason of the fact that assessors can collect births in townships in addition to physicians, the returns from townships are more complete.

A comparison of the returns as to sex shows the prevalence of the same law found elsewhere, viz.: that, as if to make up for the greater exposures of men in their occupations, the number of males born exceed the number of females. Thus of those as to whom the vital facts are given, on page 384 of the last report, 59,998 were males and 56,736 were females.

In our returns effort has been made also to secure a record of the number of previous children, and of the number actually living at the time the birth return was made.

In an aggregate of 337,163 children it is thus found that 257,343 only were living, thus showing that 77,820 had died while the parents were still in the child-bearing period. Adding to these the number of 7,195 dying just at the period of birth, we have a loss of 87,000 children. With all the sentimentality about the survival of the fittest, it is nevertheless true that the material resources of a country are best when the vigor of stock or the conditions of living and of surroundings are such as to greatly diminish this loss. If the average deaths among horses or cattle equalled this, we should, as a mere economic

consideration, have large provision made by the government to ascertain the cause of so chronic a mortality. As we come to study the death tables, we shall find that children, beyond all others, perish from preventable diseases, and that their proportionate loss is a fair indication as to the presence of those ailments which also destroy the larger proportion of the adult population who die before fifty years of age. The extremes can also be shown by the comparison of the aggregate of cities of over five thousand with the population of the State outside of cities, as also by comparing cities with such rural counties as have few if any cities.

The number of children born in the five years, as to whom the facts are stated, is 116,734. The number of native fathers is 74,844, and of native mothers 81,120. The number of foreign fathers is 40,058, and of foreign mothers 33,971. While the State has a large foreign population, this seems to show that the native stock is not dying out. The 14,876 of mixed parentage is also to be considered as adding to native stock, since where one parent is native and the other has adopted the State as a home, the influence is generally that of more rapid assimilation to the customs and manners of the people. It is evident that the native-born Jerseymen cling to their State with more tenacity than is shown in New England and in most western populations, as there is no large emigration from the other States to this State.

It is noticeable, however, that the actual number of children born is small in proportion to the number of families represented. For the sum of native and foreign fathers is 114,902, and of native and foreign mothers 115,091—allowing for some double marriages, for some where the facts as to only one parentage are given, and for some omissions of return as to the number of children. When we note 121,408 children returned as born (116,736 having the actual facts given), with 7,195 still-births, we find that we come short of an average of two children born in every five years. This would be an average of six for families as a whole for the whole child-bearing period, which extends to about thirty years. Whatever raises the average birth-rate of children born in wedlock, for parents living in the State and whose surroundings are such as are favorable to health, also furnishes a real increase of productive resources to the State. It is a marvelous and instructive study of history to see how some kingdoms and some rulers have recognized this; also, to see how prosperous periods have

been marked by a fair increase, while periods of financial calamity or social degradation result in national burden or national extinction because of the decrease of population.

The greatest calamity of Rome was the lowness of its birth-rate and the highness of its death-rate.

The statistics of this State are as yet not sufficiently numerous or complete for us to arrive at more than approximate conclusions. But the progress of the last five years clearly shows that it is feasible for us to study even what facts we have by the light of those expectations of natural life and prosperity which can be calculated from older nations, and thus arrive at some indices as to the promotion of marriage, of family homes and of surroundings favorable to the rearing of native-born, industrious and educated citizens. For it is out of such conditions that nationality grows and that national existence and prosperity are assured. Patriotism and true thrift are fostered by such oversight.

As only 2,846 colored children are reported as born for the five years, it is shown that these form a very small proportion of our population. As a rule, they are not under such favorable circumstances as most of the white races. The large demands of our summer resorts and other influences, are likely to retain many colored families in the State, and good attention should be given to their education and industrial occupation.

MARRIAGES.

The marriage-rate for the State for the five years, as given in the last report, is 15.10 to every 1,000 persons living. Inasmuch as the first year the system of registration had not become familiar to all, and as there are, no doubt, occasional failures of return, this is something below the actual proportion. The fact that divorces are less common in New Jersey than in the other States, also adds to the significance of the marriage record. That for Rhode Island for 1882 was 18.33 for each 1,000 of population; that of Massachusetts being 18.60. The rate in England for 1882 was 15.5 persons married to 1,000 persons living.

The study of occupations is, in this country, much more difficult than in foreign tables, because persons so often do not have any trade, or if they have one, change the occupation during life. We therefore have preferred to take the given occupation of the person at the time

of marriage as given by himself, rather than to rely upon the one named in the death certificate.

In a synopsis of 39,219 marriages, as to which such particulars are given, we find as follows:

Cultivators of ground	7,226	Manufacturers	277
Water employes	1,263	Masons	343
Railroad employes	1,361	Millers	176
Laborers	4,758	Painters	742
Bakers	387	Photographers	36
Barbers	319	Physicians	276
Blacksmiths	659	Plumbers	166
Brewers	124	Police and watchmen	93
Bricklayers	71	Potters	273
Butchers	641	Printers	339
Cabinet makers	115	Restaurant keepers	77
Carpenters and joiners	1,467	Shoemakers	561
Carriage makers	124	Stationers	22
Cigar makers	300	Stone cutters	131
Clergymen	179	Surveyors and civil engineers	57
Clerks and book-keepers	2,910	Tailors	307
Coopers	90	Tanners	118
Dentists	72	Teachers	241
Druggists	210	Telegraphers	199
Editors	47	Tobacconists	58
Furnacemen	9	Weavers	357
Glass makers	364	Wheelwrights	97
Grocers	386	Workers in wool, silk and cotton	460
Harness makers	145	Other trades	5,860
Hatters	620	Merchants	2,101
Innkeepers	304		
Jewelers	356	Total	39,219
Lawyers	271		
Machinists	1,074		

Cultivators of the ground outnumber any other occupation, which shows how agriculture, in some form, maintains its prominence as a chosen industry of our people. This is the more noticeable, since one-half of our population live in cities of over 5,000 inhabitants.

It is worthy of note how well the trades are distributed, and, at the marriageable age of young life, we have a fair share of carpenters, (1,467), machinists (1074) and other trades. Masons and bricklayers number 414, which is small for so large a city population, although many take up the business afterward. 1,361 railroad employes and 1,263 water employes, married, also stand for a large number engaged

in these avocations. 2,910 married clerks and book-keepers shows a mercantile constituency constantly increasing. The marriage of 620 hatters, 364 glass-workers, 273 potters and 357 weavers, is also an indication as to these industries. Also, the localities and concentrations of industries are there shown. Thus, of the hatters married, 550 resided in Essex county. Of the glass-workers, 189 in Cumberland, 276 in Gloucester county; of the potters, 237 in Mercer county, and of the weavers, 192 in Passaic county.

Yet there are other industries that are well distributed throughout the State. It is hoped that the time will come when well-endowed industrial schools will aid in the work of the various mechanical industries, and so enlarge the sphere in which there are so many indications for great extension. It will be understood that the numbers here given do not represent the actual number now engaged in these various occupations in the State, as very many pursue these industries who were not married in the State. But it is an indication of what are the chief and chosen occupations of those who were reared in the State, or at an early age made it their home.

The tables as to nationality, which are published in the present report, but relate to the records to July 1st, 1883, also furnish the facts herewith given.

The first column of figures stands for those born in the United States; the second for a parentage in which one of the parents was native; the third for Irish; the fourth for Germans, and the fifth for all other countries.

SUMMARY OF MARRIAGES.

	U. S.	U. S., in part.	Irish.	German.	Other Foreign.
Atlantic county, 1878–79	90	3	2	16	8
1879–80	84	2	6	13	6
1880–81	67	3	......	19	4
1881–82	67	7	1	12	3
1882–83	64	2	......	18	4
	372	17	9	78	25
Atlantic City, 1880–81	14	6	......	1	2
1881–82	32	2	3	2	5
1882–83	49	1	......	5	5
	95	9	3	8	12
Bergen county, 1878–79	131	9	18	20	21
1879–80	117	6	9	31	24
1880–81	131	5	9	20	20
1881–82	124	10	9	41	31
1882–83	97	6	12	35	14
	600	36	57	147	110
Burlington county, 1878–79	206	17	8	8	16
1879–80	232	11	9	6	9
1880–81	219	15	10	13	8
1881–82	221	9	13	8	10
1882–83	220	7	7	20	8
	1,098	59	47	55	51
Bordentown, 1878–79	32	2	8	1	4
1879–80	36	1	8	1	......
1880–81	24	......	8	2	......
1881–82	34	2	7	2	1
1882–83	40	1	10	5	2
	166	6	41	11	7
Burlington city, 1878–79	61	......	2	......	2
1879–80	43	......	8	......	6
1880–81	33	4	4	2	2
1881–82	53	4	3	1	3
1882–83	43	2	6	......	1
	233	10	23	3	14
Camden county, 1878–79	69	6	2	10	2
1879–80	88	5	3	7	6
1880–81	84	1	......	2	3
1881–82	48	4	2	4	2
1882–83	66	......	......	5	1
	355	16	7	28	14

SUMMARY OF MARRIAGES.—Continued.

	U. S.	U. S., in part.	Irish.	German.	Other Foreign.
Camden city, 1878–79	212	41	21	23	25
1879–80	280	21	35	28	36
1880–81	286	15	25	38	18
1881–82	327	19	18	35	31
1882–83	323	14	24	37	36
	1,428	110	123	161	146
Gloucester City, 1878–79	13	1	12	2	......
1879–80	19	3	14	1	4
1880–81	18	1	7	2	2
1881–82	17	2	12	1	6
1882–83	21	3	5	1	10
	88	10	50	7	22
Cape May county, 1878–79	78	8	1	1	2
1879–80	74	3	1	......	1
1880–81	58	2	1	3	1
1881–82	54	2	2	......	1
1882–83	48	2	......	......	1
	312	17	5	4	6
Cumberland county, 1878–79	114	4	......	1	5
1879–80	120	6	2	4	7
1880–81	132	......	3	......	2
1881–82	141	4	3	2	6
1882–83	125	2	1	5	12
	632	16	9	12	32
Bridgeton city, 1878–79	73	4	......	4	......
1879–80	112	1	2	5	3
1880–81	81	2	1	4	3
1881–82	98	2	2	8	4
1882–83	71	5	1	7	2
	435	14	6	28	12
Millville, 1878–78	51	5	......	......	2
1879–80	71	6	5	3	......
1880–81	52	5	4	3	2
1881–82	88	1	6	2	2
1882–83	58	2	4	1	4
	320	19	19	9	10
Essex county, 1878–79	77	14	38	18	19
1879–80	84	9	43	16	21
1880–81	71	9	37	17	16
(East Orange)	59	3	3	6	20
1881–82	111	15	36	28	30
1882–83	86	8	41	20	31
	488	58	198	105	137

SUMMARY OF MARRIAGES.—Continued.

	U. S.	U. S., in part.	Irish.	German.	Other Foreign
Newark, 1878–79	257	34	149	341	124
1879–80	276	51	145	418	151
1880–81	328	62	147	510	172
1881–82	365	58	147	574	182
1882–83	320	54	130	623	144
	1,546	259	718	2,466	774
Orange, 1878–79	24	3	47	6	9
1879–80	32	3	48	18	9
1880–81	31	2	35	8	14
1881–82	28	6	52	23	10
1882–83	35	5	46	17	15
	150	19	228	72	57
Gloucester county, 1878–79	128	13	9	11	6
1879–80	133	5	7	7	15
1880–81	148	4	7	12	9
1881–82	141	2	8	10	5
1882–83	130	3	15	9	5
	680	27	46	49	40
Hudson county, 1878–79	11	1	3	10	11
1879–80	12	6	4	16	6
1880–81	9	3	4	20	8
1881–82	10	5	14	22	9
1882–83	14	4	12	29	27
	56	19	37	97	61
Bayonne, 1878–79	6	......	1	4	3
1879–80	11	1	13	9	7
1880–81	21	5	23	7	7
1881–82	21	4	23	15	9
1882–83	15	2	23	7	6
	74	12	83	42	32
Harrison, 1878–79	3	2	7	1	4
1879–80	4	......	10	1	4
1880–81	9	1	14	1	5
1881–82	......	4	17	1	3
1882–83	8	1	15	1	4
	24	8	63	5	20
Hoboken, 1878–79	40	5	5	70	69
1879–80	37	6	13	77	60
1880–81	26	6	21	113	53
1881–82	39	4	59	127	87
1882–83	39	12	50	113	70
	181	33	148	500	339

SUMMARY OF MARRIAGES.—Continued.

	U. S.	U. S., in part.	Irish.	German.	Other Foreign.
Jersey City, 1878–79	161	32	85	127	100
1879–80	242	42	127	162	127
1880–81	251	53	124	181	137
1881–82	279	51	142	218	154
1882–83	269	59	133	261	141
	1,202	237	611	949	659
Town of Union, 1878–79	......	......	1	28	5
1879–80	3	......	1	42	2
1880–81	2	......	......	42	4
1881–82	6	3	1	48	12
1882–83	3	1	......	69	6
	14	4	3	229	29
Hunterdon county, 1878–79	249	......	14	5	5
1879–80	244	4	17	4	6
1880–81	232	2	6	4	5
1881–82	218	3	8	5	7
1882–83	235	4	8	3	5
	1,178	13	53	21	28
Mercer county, 1878–79	113	5	16	9	8
1879–80	122	3	12	13	11
1880–81	117	8	14	11	8
1881–82	99	2	7	2	9
1882–83	78	6	9	3	6
	529	24	58	38	42
*Chambersburg, 1878–79	......	......	......	......	......
1879–80	......	......	......	......	......
1880–81	......	......	.....	.....	......
1881–82	9	1	1	5	11
1882–83	19	2	6	11	8
	28	3	7	16	19
Trenton, 1878–79	134	19	38	29	38
1879–80	156	10	57	42	44
1880–81	168	12	37	38	53
1881–82	175	18	55	40	47
1882–83	183	16	46	42	46
	816	75	233	191	228
Middlesex county, 1878–79	98	7	2	19	14
1879–80	125	7	17	15	11
1880–81	120	8	12	10	16
1881–82	132	5	23	22	56
1882–83	136	15	26	28	55
	611	42	80	94	152

* Included in Trenton.

SUMMARY OF MARRIAGES.—Continued.

	U. S.	U. S., in part.	Irish.	German.	Other Foreign.
New Brunswick, 1878–79	69	11	6	13	6
1879–80	70	5	13	17	7
1880–81	70	4	27	25	10
1881–82	89	8	30	27	17
1882–83	56	10	43	26	13
	354	38	119	108	53
Monmouth county, 1878–79	299	24	24	4	18
1879–80	360	18	39	11	18
1880–81	362	16	33	10	23
1881–82	344	15	34	17	15
1882–83	377	18	34	19	29
	1,742	91	164	61	103
Morris county, 1878–79	144	4	23	13	26
1879–80	176	11	22	9	45
1880–81	188	11	26	7	40
1881–82	168	13	34	7	49
1882–83	188	8	27	13	50
	864	47	132	49	210
Morristown, 1878–79	29	1	1	4	2
1879–80	22	5	3	1	3
1880–81	29	1	2	4	5
1881–82	21	4	3	......	4
1882–83	25	1	12	1	7
	126	12	21	10	21
Ocean county, 1878–79	68	1	2	2	2
1879–80	91	6	2	......	3
1880–81	83	......	1	2	3
1881–82	79	......	......	1	1
1882–83	96	2	2	2	2
	417	9	7	7	11
Passaic county, 1878–79	52	5	5	2	21
1879–80	69	2	4	2	9
1880–81	70	1	3	1	3
1881–82	59	2	5	......	7
1882–83	55	4	......	1	8
	305	14	17	6	48
Passaic City, 1878–79	......	......	......	......	......
1879–80	14	3	12	3	13
1880–81	20	2	22	6	15
1881–82	21	2	15	2	29
1882–83	18	2	13	7	23
	73	9	62	18	80

SUMMARY OF MARRIAGES.—Continued.

	U. S.	U. S., in part.	Irish.	German.	Other Foreign.
Paterson, 1878–79	93	22	53	39	116
1879–80	139	19	48	54	154
1880–81	153	41	50	53	213
1881–82	153	31	64	50	244
1882–83	140	24	76	46	238
	675	137	291	242	965
Salem county, 1878–79	155	6	......	4	5
1879–80	145	4	1	4	5
1880–81	92	2	3	8	2
1881–82	88	2	2	3	5
1882–83	96	......	2	1	1
	576	14	8	20	18
Salem city, 1878–79	......	......	......	......	......
1879–80	......	......	......	......	......
1880–81	32	2	3	1	1
1881–82	39	1	4	......	3
1882–83	47	1	2	......	......
	118	4	9	1	4
Somerset county, 1878–79	112	5	13	14	7
1879–80	117	7	11	14	11
1880–81	135	3	12	18	11
1881–82	114	3	15	18	12
1882–83	115	6	16	14	8
	593	24	67	76	49
Sussex county, 1878–79	149	3	1	2	8
1879–80	149	6	1	4	8
1880–81	131	2	5	......	7
1881–82	158	4	5	5	9
1882–83	173	3	3	3	7
	760	18	15	14	39
Union county, 1878–79	25	......	5	2	3
1879–80	32	4	3	5	11
1880–81	23	5	5	4	11
1881–82	31	......	1	6	4
1882–83	37	2	4	5	3
	148	11	18	22	32
Elizabeth, 1878–79	54	10	43	40	19
1879–80	72	10	24	33	19
1880–81	85	11	56	38	28
1881–82	73	13	70	50	45
1882–83	81	9	53	48	26
	365	53	246	209	137

SUMMARY OF MARRIAGES.—Continued.

	U. S.	U. S., in part.	Irish.	German.	Other Foreign.
Plainfield, 1878–79	14	1	4	......	1
1879–80	40	1	5	6	7
1880–81	34	3	2	4	5
1881–82	45	4	5	5	13
1882–83	32	1	10	4	6
	165	9	26	19	32
Rahway, 1878–79	27	2	7	13	7
1879–80	34	4	6	9	4
1880–81	29	5	2	7	9
1881–82	31	2	5	7	5
1882–83	25	2	7	9	10
	146	15	27	45	35
Warren county, 1878–79	194	6	7	9	4
1879–80	173	6	6	7	8
1880–81	184	3	13	4	13
1881–82	1[illegible]0	7	6	6	15
1882–83	190	7	8	5	12
	891	29	40	31	52
Philipsburg, 1878–79	30	3	11	4	2
1879–80	46	......	3	2	4
1880–81	54	4	6	4	5
1881–82	53	1	4	4	2
1882–83	69	2	1	8	2
	252	10	25	22	15

CLIMATOLOGY.

In a State which presents such a diversity of soil, of climate and of altitude as our own, the study of climate as related to disease is most important. The relation, too, of the long extent of sea-coast and the diverse character of our rivers and lakes, cannot be too carefully considered. Practitioners of medicine who are located in one section for a score of years, come to know much as to these local influences. They are often able, within the area of their own ridings, to point out the effects of geological strata or drift of rivers, ponds or the soil of water-level, of winds and of hills, woods and valleys, and so to estimate how to secure changes of climate without distant removal. We ask such to carefully study these tables of climate as related to disease, and in correspondence to add the results of their own observations. In the report of last year space did not permit a completion of the tables relating to the five years from July 1st, 1878, to July 1st, 1883. These will be added after the tables of this year, and will thus be available for reference and study. This report and the last will thus furnish a condensed weather table for five years. In reference, especially, to respiratory and malarial diseases, we think the careful student will be able to trace important differences in different localities of the State. We call attention to former articles in the reports on climatology, as these have so supplemented each other as to be an aid to the student. Our reports are mostly from the localities before chosen. On account of the removal of Mr. Richardson from Freehold, we have not a complete report therefrom. We miss, too, the accustomed hand of Hon. Wm. A. Whitehead, deceased, whose labors are of such value to all students of climatology, and especially to those in this State. We are indebted to the following observers:

I. Newton, Miss E. Foster.
II. Paterson, Wm. Furgason.
III. Newark, Arthur Ward, M.D.
IV. New Brunswick, P. V. Spader, Esq.
V. Freehold, ——— ———.
VI. Vineland, John Ingram, M.D.
VII. Barnegat and Cape May, U. S. Signal Service.
VIII. Sandy Hook, U. S. Signal Service.

The tables of New York and Philadelphia are accessible for comparison. We may mention Lakewood, Atlantic City and Cape May as having shown advantages of winter climate that have been carefully recognized by many physicians and invalids. In summer not alone at our seaside, but also amid the hills of Morris, Sussex and Warren, and at some of the small lakes, there are found very desirable resorts.

METEOROLOGICAL SUMMARY OF VARIOUS STATIONS FROM JULY 1st, 1883, TO JULY 1st, 1884.

STATION, DENNIS LIBRARY, NEWTON, N. J.

Latitude, 41° 2′ 45″ N.; Longitude, 2° 19′ 48″ E. Height of Barometer Cistern above Sea Level, 660 feet.

OBSERVER, MISS E. FOSTER

	Barometer Reduced to 32°.			Thermometer.			Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equaled 0.01.	Cloudy Days.	Rain-fall on days.	Thunder and Lightning on Days.	Snow-fall on Days.	Fog.	Hail.	Frost.	Lunar Halos.
	Max.	Min.	Mean.	Max.	Min.	Mean.													
1883.																			
July	29.476	28.985	29.240	96.7	49.3	74.02	64.00	S. W.	4.00	....	14	3	14	14	...	3	1	...	...
August	29.557	29.003	29.299	90.2	46.3	69.12	61.36	S. W., N. E.	1.43	....	6	6	7	3	...	2	...	2	2
September	29.693	28.696	29.332	82.0	38.0	60.73	64.91	S. W., N. E.	2.85	....	8	10	10	3	...	2	...	5	3
October	29.875	28.656	29.404	60.2	28.9	50.88	68.15	N. E.	6.645	....	11	13	13	1	...	5	...	6	4
November	29.779	28.894	29.357	69.3	17.7	43.41	60.63	S. W.	1.665	trace.	11	10	11	......	4	4	...	4	3
December	29.880	28.707	29.638	59.0	0.0	31.22	66.60	S. W., N. W.	3.306	22.5	16	11	9	......	8	3	...	7	5
1884.																			
January	29.996	28.336	29.308	46.2	5.0	23.56	69.66	S. W., N. E.	4.31	20.0	14	15	7	......	9	1	...	17	...
February	29.890	28.481	29.281	55.6	1.6	33.54	73.36	N. E., S. W.	4.635	14.0	16	15	15	......	4	9	...	3	1
March	29.655	28.765	29.236	62.9	2.7	36.00	69.18	N. E.	4.33	6.5	16	12	12	1	8	2	1	6	2
April	29.394	28.435	29.081	76.5	29.6	48.10	59.72	N. W.	2.29	4.5	8	8	7	1	3	...	...	6	4
May	29.510	28.826	29.186	92.5	36.8	60.89	58.21	S. W., N. W.	3.42	....	15	6	16	6	...	3	...	2	...
June	29.741	28.951	29.329	97.9	42.5	71.97	65.00	S. W., N. E.	2.37	....	5	4	7	2	...	3	...	3	...
For the year	29.703	28.727	29.307	75.75	24.81	50.28	65.23	S. W.	41.251	67.5	140	113	128	31	36	37	2	61	24
Extremes	29.996	28.336	....	97.9	0.0	....	....	....	....	....	.....	.....	.....	.....	...	...	...	...	...

* Including melted snow.

REMARKS.—1883, July—Frequent thunder showers occurring at night. Precipitation above the average. Duration less than one-half that of July, 1882. There were two days of entire cloudiness Rheumatism, pneumonia and typhoid fever appeared during the month. August—Average temperature low, the mean of the maxima being 4.5° below the average for August. No rain from 2d to 16th. Heavy dews From 7th to 12th, winds were from points S E and N. E. During that period, a severe form of influenza appeared among families living near the low, wet meadows which lie northeast of the town. Frost on 27th Scarcity of water in wells Diphtheria prevalent at close of the month. Autumn, 1883, was nearly 1.7° below the average Rain-fall deficient in September and November First killing frost on October 6th Ground frozen. Intermittent fever appeared. The northwest winds of November were frequent and disagreeable. Epidemic rose-rash appeared in the early part of the month. December was mild until the 16th. Then ten days of snow and rain, which left 10 inches of snow on the ground at the close of the month The temperature on the 23d did not rise above zero the entire day. Remittent fever, fatal. The low mean humidity of the six months, July to December, is greatly in contrast with the corresponding period of 1882, which shows 80 per cent., all of the months having a higher mean. The general health of the community has been good. 1884, January—Daily range of temperature was normal; monthly range was 8° below the average The month was steadily cold. Ground covered with snow and ice 31 days Dysentery appeared in latter half of the month February—Frequent fogs and mists. There were 171 hours of precipitation. Cellars flooded from the 15th to the 29th. Temperature of 29th unprecedented, average for the day being 6.0° Rheumatism and deafness prevalent. Winter, 1883-84, was 1.69° above the average. March—Memorable for the ice-storm of the 8th and 9th Trees covered with ice five days No abrupt changes in temperature until during the gale of 29th and 30th, there was a fall of 40° in 12 hours, temperature remaining below the freezing-point 24 hours. Cellars were flooded from 19th to the close of the month. Catarrhal fever and rheumatism appeared April—Cold, icy winds; low humidity. Scarlatina and diphtheria prevalent. May—First half wet and foggy. Ice formed on the 29th. June had a wider daily range than any of a series of seven years. Low night temperature. Rain-fall deficient. The yearly mean temperature was 0.29° low.

STATION, PATERSON, N. J.

Latitude, 40° 55′ N.; Longitude, 74° 11′ W. Height of Rain Gauge above Sea Level, 142 feet.

OBSERVER, WILLIAM FERGASON, CITY SURVEYOR.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when precipitation equaled 0.01.	Cloudy days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.						
1883.													
July	....	....	....	97	59	70	38	....	....	2.92	....	11	....
August	....	....	....	90	57	71	33	....	....	1.30	....	4	....
September	....	....	....	81	49	66	32	....	....	5.41	....	8	....
October	....	....	....	85	34	52	41	....	....	4.38	....	12	....
November	....	....	....	70	22	44	46	....	....	0.97	....	7	....
December	....	....	....	53	....	32	58	....	....	2.89	25.5	12	....
1884.													
January	....	....	....	49	....	26	45	....	....	5.16	12.5	12	....
February	....	....	....	52	5	35	47	....	....	5.74	10.5	16	....
March	....	....	....	69	6	38	63	....	....	3.20	2.5	10	....
April	....	....	....	76	33	48	49	....	....	2.40	....	8	....
May	....	....	....	87	40	60	47	....	....	4.47	....	11	....
June	....	....	....	92	48	69	37	....	....	4.36	....	6	....
For the year	....	....	....	....	....	....	....	....	....	43.26	50	117	....

* Including melted snow.

STATION, NEWARK, N. J,

Latitude, 40° 44′ N.; Longitude, 74° 10′ W. Height of Barometer Cistern above Sea Level, 35 feet.

OBSERVER, DR. WARD.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equaled 0.01.	Cloudy Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.						
1883.													
July	30.2	29.8	30.0	97.0	55.0	75.37	20.33	....	N.W.	2.76	....	15	13
August	30.3	29.75	30.02	90 0	54.0	70.65	21.411	....	W., N.W.	2.46	....	4	14
September	30.33	29.653	29.991	84.0	41.0	62.21	17.45	....	N.E., S.W.	4.74	....	8	11
October	30.65	29.625	30.09	78.0	33.0	57.75	13 878	....	N.E., N.W.	5.36	....	10	15
November	30.63	29.75	30.22	69.0	19.5	43.33	11.59	....	W., S.W.	1.43	....	8	13
December	30.78	29.75	30.033	54.0	2.0	32.3	10.1	....	W., N.W.	2.72	.25	13	15
1884.													
January	30.9	29.4	30 15	42.75	3.0	22.02	15.07	....	S.E., N.W.	5.16	4.25	9	17
February	30.7	29.3	30.0	55.5	5.0	34.28	10.88	....	W., N.W.	4.14	7.0	10	26
March	30.4	29.55	29.97	61.0	3.5	36.35	17.15	....	N.W.	5.63	1.0	8	24
April	30.2	29.225	29.71	69.5	31.0	48.337	16.83	....	N.W.	2.66	....	7	26
May	30.275	29.7	29.98	89.0	42.0	61.116	18.66	....	N W., S W.	4.04	....	8	30
June	30.3	29.65	30.02	94.0	50.0	72.85	19.96	....	S.E., S.W.	4.95	....	4	22
For the year	....	....	....	....	....	....	....	....	....	....	....	....	....

* Including melted snow.

STATION, NEW BRUNSWICK, N. J.

Latitude, 40° 29′ N.; Longitude, 74° 26′ W., or 2′ 37′ E. Height, 115 feet.

OBSERVER, P. VANDERBILT SPADER.

	Barometer. Reduced to 32°.			Thermometer.									
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equaled 0.01.	Cloudy days.
1883.													
July	......	......	......	......	......	......	......	......	......	3.44	......	14	......
August	......	......	......	......	......	......	......	......	......	4.40	......	6	......
September	......	......	......	......	......	......	......	......	......	3.35	......	12	......
October	......	......	......	......	......	......	......	......	......	4.29	......	12	......
November	......	......	......	......	......	......	......	......	......	1.49	......	11	......
December	......	......	......	......	......	......	......	......	......	3.61	......	14	......
1884.													
January	......	......	......	......	......	......	......	......	......	5.63	......	13	......
February	......	......	......	......	......	......	......	......	......	5.28	......	19	......
March	......	......	......	......	......	......	......	......	......	4.23	......	15	......
April	......	......	......	......	......	......	......	......	......	2.20	......	9	......
May	......	......	......	......	......	......	......	......	......	3.17	......	11	......
June	......	......	......	......	......	......	......	......	......	5.34	......	9	......
For the year	......	......	......	......	......	......	......	......	......	46.43	......	145	......

* Including melted snow.

STATION, VINELAND, N. J.

Latitude, 39° 29′; Longitude, 75° 1′ W. Height of Barometer Cistern above Sea Level, 110 feet.

OBSERVER, J. INGRAM, M.D.

	Barometer. Reduced to 32°.			Thermometer.									
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when precipitation equaled 0.01.	Cloudy days.
1883.													
July	30.069	29.580	29.856	98	56	77.68	......	68.87	S.W.	3.515	......	8	13
August	30.096	28.654	29.902	94	50	70.95	......	61.32	N.E., S.E.	2.000	......	6	7
September	30.221	29.521	29.932	84	40	65.38	......	72.19	N.E.	4.960	......	8	17
October	30.462	29.311	30.026	82	32	55.76	......	77.01	N.E., N.	7.060	......	14	14
November	30.458	29.663	30.033	76	30	46.07	......	63.58	S.W., N.W.	1.870	......	8	12
December	30.433	29.446	29.961	62	10	35.44	......	63.47	SWNENW	5.160	8.75	11	14
1884.													
January	30.656	29.060	29.998	52	4	28.11	......	65.48	N.E., N.W.	11.555	12.00	14	13
February	30.587	29.070	29.970	67	10	40.15	......	74.31	S.W., N.E.	6.775	0.50	15	16
March	30.213	29.858	29.772	68	10	41.44	......	71.64	N.W., N.E.	6.590	8.00	14	17
April	29.960	28.961	29.672	74	28	50.53	......	70.10	W., N.W.	3.330	2.00	6	16
May	30.041	29.410	29.736	92	42	64.93	......	67.27	S.W.	1.990	......	5	10
June	30.399	29.669	29.962	98	48	73.48	......	64.56	S.W.	1.968	......	7	10
For the year	......	......	29.903	......	......	54.15	......	68.315	......	56.793	31.25	116	159

*Including melted snow.

STATION, BARNEGAT CITY, N. J.

Latitude, 39° 46′ N.; Longitude, 74° 6′ W. Height of Barometer Cistern above Sea Level, 22 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	BAROMETER.† Reduced to 32°.			THERMOMETER.									
	Max.	Min.	Mean.	Max.	Min.	Mean.	Range.‡	Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when precipitation equaled 0.01.	Cloudy days.
1883.													
July	30.238	29.708	29.965	91.0	59.5	72.9	31.5	81.5	S.W.	2.43	....	14	3
August	30.245	29.648	30.014	86.0	58.0	70.4	28.0	76.7	E.	2.13	....	7	4
September	30.396	29.524	30.049	77.0	48.0	64.4	29.0	80.5	E.	4.84	....	12	9
October	30.614	29.424	30.138	74.0	40.3	55.4	33.7	78.6	E	6.51	....	19	13
November	30.615	29.714	30.134	63.0	24.0	46.3	39.0	74.0	S.W.	1.06	....	14	8
December	30.637	29.465	30.087	57.0	11.0	37.2	46.0	75.7	N.	2.83	....	16	13
1884.													
January	30.828	29.139	30.113	52.0	7.0	28.9	45.0	77.7	N.	5.25	....	15	11
February	30.716	29.145	30.052	56.8	§13.0	37.8	43.8	87.7	N.W.	1.11	....	21	10
March	30.454	29.470	29.995	63.0	11.3	39.0	51.7	79.2	N.W.	2.38	....	18	10
April	30.176	29.092	29.827	61.9	32.3	46.9	29.6	71.8	N.W.	0.97	....	8	12
May	30.289	29.571	29.934	81.2	42.4	58.7	38.8	74.5	S.W.	0.79	....	9	6
June	30.491	29.744	30.061	82.8	48.1	66.2	34.7	77.6	S.W.	2.24	....	5	4
For the year	....	....	....	....	....	....	....	....	....	....	....	....	....

* Including melted snow, dew, fog, sleet, hail and frost.
† Corrected for temperature and instrumental error only.
‡ The mean daily range is probably what is desired.
§ From exposed thermometer, minimum broken.

STATION, CAPE MAY, N. J.

Latitude, 38° 56′ N.; Longitude, 74° 58′ E. Height of Barometer Cistern above Sea Level, 27 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	Barometer.† Reduced to 32°.			Thermometer.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equaled 0.01.	Cloudy days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Range.‡						
1883.													
July	30.213	29.672	29.963	89.0	59.0	73.7	30.0	80.7	S.	2.39	....	8	1
August	30.211	29.634	29.999	86.0	57.0	71 6	29.0	75.4	S	3.03	....	5	4
September	30.361	29.588	30.088	80.0	44.5	66.2	35.5	77.5	N.E.	4.59	....	5	7
October	30.564	29.422	30.115	74.0	38.0	56.9	36.0	76.1	N.E.	8.63	....	15	9
November	30.606	29.751	30.129	64.0	22.0	48.3	42.0	73 6	N.W.	3.39	....	10	7
December	30.620	29.461	30.065	57.0	14.0	39.7	43.0	79.6	N.W.	3.81	....	13	8
1884.													
January	30.777	29.228	30.110	50.5	11.0	31.6	39.5	80.0	N.W.	5.56	....	17	11
February	30.656	29.125	30.062	54.0	13.0	39.5	41.0	84.0	N.W.	6.22	....	17	8
March	30.421	29.448	29.990	54.5	13.0	40.0	41.5	82.9	N.W.	5.61	....	18	8
April	30.183	29.168	29.834	63.5	32.0	48.2	31.5	79 0	N.W.	2.24	....	11	10
May	30.260	29.591	29 925	80 0	43.0	59.8	37.0	76.2	S.	1.19	....	8	6
June	30.383	29.679	30.034	86.0	49.0	67.6	37.0	79.8	S.	1.03	....	8	7
For the year	....	....	....	....	....	....	....	....	....	....	....	....	....

* Including melted snow, dew, fog, sleet, hail and frost.
† Corrected for temperature and instrumental error only.
‡ The mean daily range is probably what is desired.

STATION, SANDY HOOK, N. J.

Latitude, 40° 28′ N.; Longitude, 74° 0′ W. Height of Barometer Cistern above Sea level, 28 feet.

OBSERVER, ——— ———.

	Barometer.† Reduced to 32°.			Thermometer.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.*	Days when Precipitation equaled 0.01.	Cloudy Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Range.‡						
1883.													
July	30.22	29.697	29.956	95.0	59.0	74.8	36.0	70.4	S.W.	2.3	....	15	5
August	30.279	29.655	30 018	91.0	61.0	72.2	30.0	68.5	W.	3.44	....	7	4
September	30.427	29.488	30.058	83.0	49.0	64.3	34.0	73.0	N.W., S.E.	4.63	....	10	10
October	30.636	29.381	30.146	77.0	39.0	55.2	38.0	72.1	E.	5.2	....	12	7
November	30.591	29.691	30.129	67.0	22.0	46.0	45.0	74.1	N.W.	1.54	....	10	5
December	30.675	29.401	30.090	57.0	5.5	35.4	51.5	73.7	N.W.	2.57	....	14	11
1884.													
January	30.832	29.116	30.115	50.0	8.0	27.7	42.0	73.4	W.	6.76	....	15	8
February	30.73	29.157	30.067	62.5	6.0	35.8	56.5	81.5	E	4.72	....	18	9
March	30.443	29.489	30.002	63.6	6.9	38.0	56.7	75.9	N.W.	4.32	....	17	11
April	30.164	29.102	29.829	67.0	34.0	47.2	33.0	76.1	N.W.	3.15	....	9	11
May	30.299	29.563	29 931	86.0	45.0	58.9	41.0	70.1	N.W.	5.27	....	11	5
June	30.523	29.734	30.065	91.2	51.3	68.4	39 9	70.6	S.	4.52	....	5	3
For the year	....	....	....	....	....	....	....	....	....	....	....	....	....

* Including melted snow, dew, fog, sleet, hail and frost.
† Corrected for temperature and instrumental error only.
‡ The mean daily range is probably what is desired, and will be sent on application

In order to complete the tables of previous years, we add first the tables of Cape May, Barnegat and Sandy Hook for the four years previous.

STATION, CAPE MAY, N. J.

Latitude, 38° 56′ N.; Longitude, 74° 58′ W. Height of Barometer Cistern above Sea Level, 27 feet.

	Barometer. Reduced to 32°.			Thermometer.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when precipitation equaled 0.01.	Cloudy days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.						
1878.													
July	30.19	29.60	29.95	90	66	75.6	....	77.3	S.	2.43	....	7	5
August	30.20	29.62	29.97	85	60	73.8	....	78 3	S.E.	6.41	....	10	7
September	30.44	29.68	30.11	86	46	70.6	....	76.7	N.E.	1.33	....	6	6
October	30.39	29.22	30.03	77	36	60.0	....	72.9	N.W.	3.38	....	9	6
November	30.53	28.95	29.96	64	29	47.3	....	74.0	N.W.	3.17	....	10	9
December	30.54	28.84	30.01	59	18	36.3	....	71.1	N.W.	7.09	....	14	7
1879.													
January	30.58	29.30	30.04	55	1	29.9	....	78.7	N.W.	3.84	....	9	7
February	30.74	29.48	30 06	50	13	32.1	....	74.3	N.W.	3 09	....	13	14
March	30.70	29.33	30.07	61	21	42.1	....	76.6	N.W.	2.99	....	15	13
April	30.39	29.38	29 88	76	29	47.6	....	74.0	N.W.	4.34	....	10	13
May	30.43	29.71	30.02	77	43	61.5	....	70.7	S.	0.25	....	4	5
June	30.25	29.50	29.94	81	52	69.2	....	72.3	S.	4.21	....	9	11
July	30.31	29.59	29.97	83	57	72.7	....	77.6	S.	4.94	....	8	9
August	30.20	29 51	29.94	87	58	72.7	....	79.1	S.	16.58	....	12	11
September	30.44	29.76	30.10	81	45	67.1	....	75.0	S.E.	1.89	....	8	8
October	30.81	29.54	30.14	81	33	63.9	....	73.3	S.W.	0.97	....	5	4
November	30.57	29.50	30.14	69	22	48 1	....	65.1	N.W.	1.09	....	8	7
December	30.63	29.66	30.15	60	15	43.9	....	75.8	S.	6.19	....	16	14
1880.													
January	30.65	29.58	30.16	56	18	43.2	....	80.3	N.W.	2.17	....	17	8
February	30.64	29.24	30.09	59	12	41.7	....	80.7	S.	2.40	....	7	9
March	30.48	29.39	30.02	65	23	42.6	....	71.5	N.	7.94	....	16	15
April	30.39	29.55	29.99	67	31	52.8	....	66.6	S.	1.68	....	11	4
May	30.23	29.81	30.04	81	41	65.2	....	75 1	S.	1.27	....	9	8
June	30.29	29.63	29.97	89	52	71.2	....	75.3	S.	3.79	....	8	8
July	30.20	29.70	29.96	90	56	75.3	....	77.6	S.	4 58	....	14	12
August	30.39	29.75	30 04	84	57	73.2	....	80.5	S.	7.49	....	13	13
September	30.36	29.69	30.02	87	52	69.1	....	74.1	N.W.	2.91	....	9	6
October	30.45	29 49	30.06	75	42	58.7	....	70.8	S.	5.07	....	8	8
November	30.70	29.60	30 21	67	16	44.1	....	68.1	N.	4.79	....	15	14
December	30.50	29.57	30.00	55	2	31.2	....	78.1	N.W.	9.21	....	15	12
1881.													
January	30.68	29.36	30.11	46	6	29 6	....	78.7	N.W.	7.36	....	11	13
February	30.78	29.41	30.16	51	5	33.6	....	73 2	N.W.	4.23	....	11	7
March	30.34	29.03	29.72	53	25	40.5	....	70.3	N.W.	4.94	....	11	12
April	30.34	29.49	29.87	70	27	45.9	....	74.0	N.W.	1.34	....	12	11
May	30.46	29.59	30.02	75	43	59 6	....	82.7	S.E.	3.51	....	10	12
June	30.17	29.61	29.88	88	53	66.5	....	76.8	S.E.	5.11	....	15	10
July	30.20	29.67	29.90	87	62	75 4	....	68.6	S.	1.20	....	12	9
August	30.31	29.66	30.02	87	58	73 5	....	77.5	S.	2.26	....	8	6
September	30.32	29.84	30.07	85	55	74.5	....	79.8	S.	1.22	....	8	4
October	30.52	29.54	30.11	81	39	62.7	....	76.1	S.	4.58	....	10	11
November	30.71	29.64	30.15	67	27	51.6	....	77.0	N.W.	5.22	....	15	17
December	30.65	29.46	30.16	62	20	43.3	....	75.5	N.W.	2.07	....	14	15
1882.													
January	30.84	29.18	30.11	52	5	36.0	....	77.2	N.W.	6.22	....	19	15
February	30.66	29.26	30.10	58	23	40.8	....	73.6	N.W.	3.19	....	12	8
March	30.64	29.57	30.04	63	23	45.0	....	70.7	N.W.	4.90	....	13	12
April	30.48	29.42	30.01	66	29	49.6	....	74.4	N.W.	2.44	....	12	9
May	30.40	29.43	29.95	75	34	55.1	....	78.6	N.E.	4.40	....	12	11
June	30.26	29.55	29.84	83	53	68.5	....	76.5	S.	2.62	....	9	8

* Including melted snow.

STATION, BARNEGAT, N. J.

Latitude, 39° 48′; Longitude, 74° 9′. Height of Barometer Cistern above Sea Level, 20 feet.

	Barometer. Reduced to 32°.			Thermometer.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when precipitation equaled 0.01.	Cloudy days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.						
1878.													
July	30.20	29.57	29.94	94.0	61.0	71.7	....	82.4	S.	6.39	....	10	7
August	30.21	29 65	29.90	85.0	59.0	71.8	....	80.7	S.	4.78	....	16	7
September	30.46	29.69	30.12	84 0	49.0	67.8	....	79.4	E.	2.90	....	10	7
October	30.39	29.36	30.02	75.0	38.0	57.0	....	76.5	N.W.	2.35	....	11	6
November	30.53	28 96	29.93	62.0	28.0	43.4	....	77.3	N.W.	4.75	....	13	9
December	30.49	28.80	29.99	57.0	12.0	32.5	....	79.2	N.W.	6.74	....	10	6
1879.													
January	30.51	29 29	30.02	61.0	−1.0	27.5	....	81.6	N.W.	3.69	....	9	8
February	30.76	29.40	30.05	47.0	8.0	28.7	....	78.2	N.W.	3.82	....	16	8
March	30.70	29.25	30.07	65.0	21.0	38.4	....	78.0	S.	3.46	....	20	9
April	30.40	29.38	29.89	69.0	23.0	44.9	....	76.2	N.W.	4.42	....	14	14
May	30 50	29.73	30.05	72.0	39.0	58.0	....	77.2	S.	2.00	....	7	5
June	30.28	29.47	29.96	84.0	48.0	65.7	....	78.5	S.	4.08	....	12	5
July	30 30	29.53	29.97	96.0	53 0	69.5	....	80.7	S.	3.57	....	14	7
August	30.19	29.47	29.93	92.0	53.0	70.9	....	81.4	S.	12.33	....	11	11
September	30.46	29.76	30.11	81.0	45.0	63.7	....	78.3	S.	2.15	....	6	8
October	30 79	29.47	30 14	82.0	30.0	59 0	....	79.5	N.W.	1.05	....	9	5
November	30.58	29.43	30.13	73.0	18.0	42.2	....	76.2	N.W.	2.10	....	13	7
December	30.64	29.63	30.16	60.0	10.0	39.6	....	86.0	N.W.	6.68	....	17	18
1880.													
January	30.69	29 52	30.16	61.0	43.0	40.5	....	85.3	N.W.	1.75	....	18	11
February	30.63	29.09	30.09	70.0	59.0	36.8	....	77.0	N.W.	3.29	....	18	10
March	30.48	29.34	30.02	73.0	56.0	39.1	....	73.9	N.W.	6.61	....	20	14
April	30.38	29.55	30 00	79.0	53.0	48.0	....	73.9	S.	3.29	....	13	7
May	30.33	29.74	30 04	91.0	57.0	62.5	....	75.2	S.	0.88	....	6	4
June	30.29	29.59	29.97	93.0	45.0	69.1	....	77.3	S.	3.67	....	11	5
July	30.19	29.68	29.96	94.0	58.0	72.9	....	79.6	S.	5.78	....	18	11
August	30.44	29.72	30 01	87.0	55.0	70.7	....	82.2	S.	6.15	....	10	11
September	30.37	29.65	30.02	89.0	49.0	66.4	....	78.3	S.	3.14	....	9	6
October	30 42	29.43	30.09	79.0	33 0	54.7	....	75.9	S.	4.05	....	10	7
November	30.74	29.59	30.21	67.0	13.0	39.9	....	74.3	N.W.	4.35	....	14	14
December	30.45	29.56	29.99	52.0	−7.0	27.8	....	79.9	N.W.	5.95	....	15	9
1881.													
January	30.61	29 23	30.11	49.0	1.0	26.6	....	78.4	N.W.	8.43	....	15	15
February	30.78	29.35	30.15	50.0	−4.0	29.4	....	78.2	N.W.	5.39	....	15	10
March	30.35	29.03	29.70	53.0	21.0	36.9	....	75.2	N.W.	7.58	....	15	15
April	30.34	29.41	29 86	70.0	22 0	43 5	....	73.5	N.W.	1.36	....	12	11
May	30.46	29.56	30.02	84 0	37.0	56.4	....	86.8	S.	1.77	....	11	11
June	30.16	29.60	29.88	86.0	48.0	63.5	....	80.9	E.	6.18	....	14	12
July	30.21	29.58	29.91	92 0	60 0	72.4	....	79.6	S.	1.99	....	7	6
August	30.31	29 62	29.99	88.0	59.0	71 1	....	81.3	S.	5.54	....	11	5
September	30.32	29.82	30.06	96.0	58 2	71.6	....	85.1	E.	3.55	....	5	7
October	30.54	29.45	30.11	82.5	38.5	59.8	....	79.1	S.	4.35	....	9	12
November	30.67	29.57	30.15	70.5	22.5	47.3	....	76.9	N.W.	3.64	....	14	14
December	30.62	29 38	30.13	60.0	21.0	40.8	....	81.0	N.W.	3.50	....	14	15
1882.													
January	30.82	29 12	30.12	54.0	−1.0	32.7	....	79.9	N.W.	8.29	....	18	13
February	30 72	29.26	30.12	52.0	18 0	36.3	....	81.6	N.W.	8.91	....	14	8
March	30.68	29.55	30.07	60.2	20.0	40.1	....	74.2	N.W.	4.44	....	12	12
April	30.51	29.40	30.01	74.0	26.6	45.9	....	71.8	S.	4.16	....	11	12
May	30.43	29.42	29.99	75.8	36 0	52.2	....	79.4	S.	7 22	....	13	9
June	30 25	29.51	29 88	95.6	52.0	66.2	....	76.8	S.	3.26	....	11	5

* Including melted snow.

STATION, SANDY HOOK, N. J.

Latitude, 40° 28′ N.; Longitude, 74° 1′ W. Height of Barometer Cistern above Sea Level, 28 feet.

	Barometer. Reduced to 32°.			Thermometer.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation reached 0.01.	Cloudy Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.						
1878.													
July	30.19	29 57	29.93	97.0	62.0	75.5	....	75.7	W.	6.08	....	9	9
August	30.20	29.58	29.89	90.0	63.0	72.5	....	79.4	W.	6 19	....	12	11
September	30.48	29.66	30.12	87.0	48.0	67.8	....	78.3	E.	4.09	....	9	8
October	30.37	29 34	30.00	79.0	42.0	58.5	....	70.9	W.	2.74	....	10	7
November	30.56	28.94	29.93	60.0	30.0	44.4	....	73.5	W.	6.96	....	12	10
December	30.49	28.77	29.96	59.0	13.0	33.5	....	72.7	W.	7.78	....	10	11
1879.													
January	30 47	29 37	29.97	49.0	—3.0	27.0	....	76.4	W.	3.22	....	8	10
February	30.75	29.34	30.03	53.0	8 0	28.1	....	72.9	N.W.	2.72	....	10	11
March	30 69	29 24	30.06	60.0	21.0	37.7	....	71 6	N.W.	4.84	....	11	8
April	30.37	29.35	29 88	71.0	24.0	44.8	....	70.1	N.W.	6.30	....	13	13
May	30.40	29.68	30 04	87.0	41.0	60.0	....	70.9	S.E.	3.59	....	8	5
June	30.26	29.43	29 93	92.0	50.0	69.3	....	71.8	S.W.	5.86	....	15	15
July	30 27	29.49	29.95	96.0	59 0	73 4	....	71.0	S.W.	5.76	....	10	14
August	30 16	29.56	29 92	92 0	59.0	72.0	....	70.9	S.W.	12.44	....	10	12
September	30.42	29.72	30.10	87.0	48.0	64.2	....	73.2	S.W.	1.13	....	7	9
October	30.77	29.47	30 12	84.0	34.0	60.5	....	71.1	W.	0.47	....	5	7
November	30.50	29 38	30.11	71.0	18.0	44.1	....	70.1	N.W.	2.15	....	6	10
December	30.60	29.58	30.15	61.0	10.0	38.5	....	78.2	S.W.	8.02	....	14	16
1880.													
January	30.70	29.49	30.16	58.0	21.0	39.6	....	80.3	W.	1.77	....	18	13
February	30.59	29.88	30.07	64.0	10.0	36.6	....	75.3	W.	1.67	....	11	9
March	30.47	29.33	30.01	67.0	17.0	37.6	....	72.1	N.W.	5.86	....	18	13
April	30.32	29.48	29.97	77.0	27.0	49.3	....	69.0	N.W.	2 69	....	10	10
May	30.40	29 66	30.02	93.0	35.0	64.8	....	71.0	S W.	2.01	....	8	4
June	30.26	29.50	29.95	93.0	50 0	71.4	....	66.6	W.	2.78	....	6	2
July	30.15	29 62	29 91	89.0	50.0	75.1	....	72.6	S W.	6.43	....	13	9
August	30.39	29 66	30 03	90 0	59.0	71.7	....	79.4	S.W.	4.26	....	9	8
September	30.34	29.63	30.00	92.0	51.0	67.5	....	73.8	W.	3.35	....	6	8
October	30 37	29.43	30.09	78.0	36.0	56.1	....	71.1	S.W.	3.97	....	11	6
November	30.70	29.48	30.20	69.0	14.0	43.1	....	65.7	N.W.	3.76	....	8	4
December	30.42	29 55	29.98	52.0	—5.0	29.5	....	69.2	N.W.	2.51	....	8	10
1881.													
January	30.65	29.25	30.09	40.0	8.0	26.2	....	73.1	N.W., W.	5.03	....	10	12
February	30 80	29.33	30.14	53.0	zero.	29.1	....	75.7	N.W.	5.37	....	12	6
March	30.35	29.02	29.70	53.0	22.0	37.5	....	77.2	N.W.	6.92	....	12	13
April	30 37	29.39	29.86	74.5	23.0	45 6	....	69.3	N.W.	1.41	....	8	5
May	30 46	29.57	30.02	91 0	42.5	60.9	....	79.3	S.E.	3.33	....	13	10
June	30.19	29.61	29.88	87.2	50.5	65 4	....	77.1	N.W.	6.80	....	16	11
July	30.22	29.56	29.91	89.2	63.2	74.0	....	74.9	S.E.	2.43	....	10	5
August	30.31	29.59	29.99	96 2	60.9	74.9	....	72.1	S.W.	0.63	....	10	3
September	30.37	29.82	30.07	101.0	58 0	74.1	....	77.3	S.E.	3.57	....	10	6
October	30.56	29 43	30 11	87.0	39.0	61 3	....	68.4	N.W.	2.71	....	8	8
November	30 66	29.56	30.15	73.0	26 0	49.1	....	67.2	N.W.	3.54	....	12	12
December	30.62	29.34	30.12	68.5	23.0	41.9	....	77.1	S.W.	5.00	....	12	13
1882.													
January	30 82	29.21	30.12	50.0	zero.	31.9	....	79.5	N.W.	6 47	....	17	12
February	30 73	29.36	30.11	58.5	20.0	36 6	....	77.7	N.W.	4 85	....	11	6
March	30.68	29.55	30 06	58.0	20.0	40.5	....	75.3	N.W.	4.00	....	12	6
April	30.51	29.35	30 00	69.0	27.0	46.8	....	73.0	N.W.	3.19	....	13	10
May	30 44	29.42	29.99	79.0	38.0	54.3	....	74.9	N.E.	7.21	....	15	10
June	30 23	29.47	29.87	91.0	50.5	68.7	....	73.7	N.W.	2.60	....	10	4
	....	....	....	....	....	....	....	....	....	....	....	....	....

*Including melted snow.

Next we place the observations for all the Stations, from July 1st, 1882, to July 1st, 1883, thus completing the aggregate for five years:

STATION, DENNIS LIBRARY, NEWTON, N. J.

Latitude, 41° 2′ 45″ N.; Longitude, 2° 19′ 48″ E. Height of Barometer Cistern above Sea Level, 660 feet.

OBSERVER, MISS E. FOSTER.

	Barometer. Reduced to 32°.			Thermometer.									
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.	Mean Humidity.	Prevailing Wind.	Rain (Inches).*	Snow.	Days when Precipitation equaled 0.01.	Cloudy days.
1882.													
July	29.576	28.629	29.262	94.7	53.3	74.16	....	74.41	S.W.	2.40	trace.	8	3
August	29.663	28.868	29.298	96.1	50.0	72.06	....	79.28	S.W.	3.64	....	8	11
September	29.583	28.912	29.313	86.0	40.2	65.11	....	87.00	N.E.	9.36	....	12	12
October	29.623	28.981	29.342	74.0	36.0	55.51	....	68.66	N.E.	3.695	trace	13	14
November	29.750	28.850	29.376	64.2	18.2	39.25	....	80.41	N.E.	1.20	12.0	4	10
December	29.677	28.863	29.302	48.0	6.9	29.19	....	70.43	N.W.	1.85	3.3	8	15
1883.													
January	29.839	28.782	29.377	46.3	0.2	23.66	....	72.44	N.E.	3.441	20.3	16	17
February	29.932	28.434	29.464	52.7	11.2	29.96	....	63.86	S.W., N.W.	3.143	11.0	17	12
March	29.669	28.496	29.174	62.0	6.2	31.60	....	61.74	N.W., S.W.	2.33	14.8	7	6
April	29.699	28.864	29.245	70.2	19.8	47.60	....	65.54	S.W., N.E.	3.935	2.3	15	8
May	29.616	28.748	29.307	86.0	37.0	60.69	....	62.08	S.W.	2.92	....	10	8
June	29.701	28.830	29.237	94.8	46.8	71.81	....	69.56	S.W.	4.83	....	11	8
For the year	29.667	28.824	29.299	73.18	27.15	50.06	....	73.11	....	41.664	63.7	129	124

* Including melted snow.

REMARKS.—1882. July had a high humidity; auroras were frequent; snow fell on the 5th. August to October, dews, fogs and mists. September 20th to 25th, excessive rain-fall. No frost until November 3d. Autumn of 1882, warm and humid. Winter of 1882-3 had a low humidity. From November 26th to March 31st, the ground was covered with snow 100 days. Season severe, but there were no abrupt changes of temperature. Spring of 1883 was cold and backward; humidity low. Auroras were frequent from November to July.

There were forty-five fogs, nineteen frosts and twenty-five thunder-storms during the year.

STATION, PATERSON, N. J.

Latitude, 40° 55′ N.; Longitude, 74° 11′ W. Height of Rain Gauge above Sea Level, 142 feet.

OBSERVER, JOHN T. HILTON, CITY SURVEYOR.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equaled 0.01.	Cloudy Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.						
1882.													
July	......	......	......	96	58	75.31	......	......	S.W.	7.01	......	8	......
August	......	......	......	95	56	71.0	......	......	S.W.	2.37	......	6	......
September	......	......	......	87	50	67.0	......	......	S.W.	25.98	......	12	......
October	......	......	......	78	37	56.0	......	......	W., S.W.	3.31	......	14	......
November	......	......	......	63	13	39.0	......	......	N.W.	1.62	.21	6	......
December	......	......	......	40	18	30.61	......	......	W.	4.00	......	9	......
1883.													
January	......	......	......	......	45	26.0	......	......	N.W.	4.22	15.5	15	......
February	......	......	......	52	11	30.0	......	......	N.W.	5.125	12.0	10	......
March	......	......	......	60	9	32.0	......	......	N.W.	1.91	.11	6	......
April	......	......	......	68	27	43.0	......	......	W.	5.99	......	12	......
May	......	......	......	85	39	59.0	......	......	S W.	5.85	......	11	......
June	......	......	......	95	56	66.0	......	......	S.W.	5.80	......	11	......
For the year	......	......	......	......	......	......	......	......	......		......	......	......

* Including melted snow.

STATION, NEWARK, N. J.

Latitude, 40° 44′ N.; Longitude, 74° 10′ W. Height of Barometer Cistern above Sea Level, about 30 feet.

OBSERVER, W. A. WHITEHEAD.

	BAROMETER.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when precipitation equaled 0.01.	Cloudy days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.						
1882.													
July	30.30	29.55	30.06	96.5	55.0	76 82	......	......	W., N.W.	3.52	......	6	13
August	30.35	29.80	30.08	93.25	52.5	73.31	......	......	S.E.	1.31	......	7	13
September	30.25	29.90	30.06	86.0	47.0	66.75	......	......	N., N.E.	17.66	......	13	16
October	30.45	29.90	30.14	72.5	41.0	57.05	......	......	N. E., S.E.	2.00	......	12	14
November	30.55	29.88	30.22	70.0	19.0	47.52	......	......	N.W.	1.77	13.25	9	9
December	30.48	29.78	30.14	46.75	10.75	30.59	......	......	N.W.,S.W.	1.95	1.75	6	10
1883.													
January	30.62	29.72	30.25	44.75	2.5	25.60	......	......	N.W.,S.W.	3.71	14.0	13	15
February	30.75	29.85	30.33	53.25	14.0	30 48	......	......	N.W.,S.W.	4.93	11.0	10	11
March	30.58	29.70	30.07	60.0	7.25	32.31	......	......	N.W.,S.W.	2.00	8.5	6	8
April	30.93	29.75	30.06	71.0	23.5	47.65	......	......	N.W., N.E	4.65	3.0	9	11
May	30.45	29.55	30.16	86.5	38.0	61.06	......	......	N.E , N.	3.35	......	10	16
June	30.30	29.65	30.01	94.0	50.0	72.85	......	......	S.E.,S.W.	4.97	......	9	13
For the year	30.93	29.55	......	96.5	2.5	......	......	......	......	51.82	51.50	110	149
Mean	30.50	29.74	30.13	......	......	51.24	......	......	......	......	......	......	......

* Including melted snow.

STATION, NEW BRUNSWICK, N. J.

Latitude, 40° 29′ N.; Longitude, 74° 26′ W., or 2° 37′ E. Height, 115 feet.

OBSERVER, P. VANDERBILT SPADER.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equaled 0.01.	Cloudy Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.						
1882.													
July	....	....	....	91	59	70.76	....	....	....	3.04	....	....	....
August	....	....	....	93	54	69.51	....	....	....	3.20	....	....	....
September	....	....	....	90	50	64.75	....	....	....	15.52	....	....	....
October	....	....	....	78	41	56.24	....	....	....	1.42	....	....	....
November	....	....	....	71	16	37.18	....	....	....	1.60	....	....	....
December	....	....	....	45	4	27.78	....	....	....	1.91	....	....	....
1883.													
January	....	....	....	45	3	24.90	....	....	....	3.71	....	....	....
February	....	....	....	55	6	28.25	....	....	....	4.67	....	....	....
March	....	....	....	62	7	29.63	....	....	....	1.96	....	....	....
April	....	....	....	70	25	41.36	....	....	....	4.03	....	....	....
May	....	....	....	82	29	54.51	....	....	....	2.82	....	....	....
June	....	....	....	95	50	69.57	....	....	....	5.24	....	....	....
For the year	....	....	....	....	....	....	....	....	....	49.12	....	....	....

* Including melted snow.

STATION, FREEHOLD, N. J.

Latitude, 40° 15′ N.; Longitude, 74° 16′ W. Height of Barometer Cistern above Sea Level, 216 feet.

OBSERVER, CHARLES F. RICHARDSON.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equaled 0.01.	Cloudy Days.	Thunder and Lightning on Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.							
1882.														
July	30.08	29.44	29.78	96.0	54.0	74.6	....	72.6	S.W.	2.11	....	8	3	6
August	30.08	29.41	29.80	90.0	50.0	70.4	....	82.2	S.	5.64	....	10	5	8
September	30.02	29.39	29.82	86.0	43.0	65.8	....	85.3	N.	11.61	....	14	11	7
October	30.10	29.51	29.86	74.0	38.0	55.3	....	85.5	N.	2.43	....	16	14	2
November	30.28	29.47	29.91	70.0	16.0	38.3	....	77.7	W.	1.63	7.6	10	6	......
December	30.17	29.49	29.86	46.0	8.0	29.8	....	75.4	W.	2.17	....	7	6	......
1883.														
January	30.35	29.32	29.94	48.0	1.0	25.5	....	79.5	N.	4.00	13.9	18	14	1
February	30.44	29.51	30.01	61.0	11.0	30.8	....	76.1	W.	5.62	12.6	15	6	......
March	30.21	29.06	29.74	68.0	10.0	32.5	....	64.4	W.	1.73	9.4	7	2	......
April	30.18	29.43	29.78	71.0	24.0	44.9	....	77.7	S.	3.90	....	12	8	4
May	30.13	29.29	29.74	83.0	34.0	58.6	....	73.6	S.	4.12	....	10	9	9
June	30.19	29.41	29.76	91.0	48.0	70.5	....	79.1	S.W.	6.91	....	12	4	9
For the year	30.18	29.38	29.75	72.8	28.0	49.7	....	77.4	W.	51.87	43.5	139	88	41

* Including melted snow.

First frost, October 25th; latest frost, May 18th. No snow in measurable amount in December.

STATION, VINELAND, N. J.

Latitude, 39° 29′ N.; Longitude, 75° 1′ W. Height of Barometer Cistern above Sea Level, 111 feet.

OBSERVER, J. INGRAM, M.D.

	Barometer. Reduced to 32°.			Thermometer.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equaled 0.01.	Cloudy Days.	Clear Observations.	Average Clouds.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.								
1882.															
July	30.180	29.531	29.887	96	54	77.78	....	70	S.W., N.W.	2.23	....	7	31	30	68.23
August	30.178	29.423	29.924	88	51	71.94	....	79	S.W., S.E.	9.29	....	13	28	28	61.30
September	30.112	29.505	29.906	87	45	68.01	....	79	S.W., N.	12.35	....	8	28	35	65.53
For 3 mos.	30.156	29.487	29.906	90	50	72.59	....	76	....	23.87	....	28	87	73	65.13
October	30.170	29.609	29.954	74	37	59.58	....	71	N.E., S.W.	1.77	....	11	27	27	67.73
November	30.342	29.718	30.015	72	22	41.18	....	63	N.W., N.E.	.99	....	6	28	27	63.73
December	30.286	29.619	29.990	51	10	33.17	....	60	N.W., W.	2.47	....	5	30	34	56.90
For 3 mos.	30.266	29.648	29.986	66	23	44.74	....	65	....	5.23	....	22	85	88	62.79
1883.															
January	30.472	29.323	30.060	45	4	28.73	....	56	N.W., N.E.	6.13	18.75	17	29	13	80.30
February	30.612	29.591	30.173	66	18	35.63	....	59	N.W., S.W.	6.47	4.50	12	28	18	74.30
March	30.360	29.145	29.775	64	12	35.95	....	55	N.W., S.W.	2.93	8.50	6	27	37	54.60
For 3 mos.	30.481	29.353	29.983	58	11	33.44	....	56	....	15.53	31.75	35	84	68	69.73
April	30.297	29.524	29.831	80	26	49.24	....	66	S.W., N.W.	3.96	....	11	30	18	73.30
May	30.158	29.319	29.819	84	34	63.65	....	66	S.W., N.E.	1.80	....	5	29	23	67.60
June	30.269	29.550	29.846	92	50	75.21	....	71	S.W., S.E.	3.72	....	7	28	21	67.10
For 3 mos.	30.241	29.464	29.832	85	36	62.71	....	67	....	9.48	....	23	87	67	69.33
For the year	30.296	29.488	29.928	75	30	53.37	....	66	....	54.11	31.75	108	343	296	66.74

* Including melted snow.

REMARKS.—Under the head of "cloudy days" is to be understood *all* days in which *any* clouds were found. By "clear observations" is to be understood the total observations free from clouds in each month, and the "average clouds" explains itself.

STATION, CAPE MAY, N. J.

Latitude, 38° 56′ N.; Longitude, 74° 58′ W. Height of Barometer Cistern above Mean Sea Level, 27 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	BAROMETER.†			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equaled 0.01.	Cloudy Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.						
1882.													
July	30.274	29.632	30,004	86.0	62	73.7	....	79.8	S.	3.49	....	7	3
August	30.269	29.629	30.001	83.0	55	73.8	....	79.3	S.	10.29	....	13	11
September	30.251	29.474	30.008	83.0	50	70.0	....	78.8	S.	7.05	....	9	8
October	30.325	29.701	30.051	75.0	48	64.3	....	78.6	N.E.	1.46	....	11	9
November	30.500	29.708	30.126	68.0	30	47.8	....	68.4	N.	1.88	....	8	10
December	30.465	29.629	30.099	60.0	14	38.3	....	74.8	N.W.	3.88	....	7	5
1883.													
January	30.630	29.463	30.149	50.0	11	33.8	....	79.3	N.W.	5.00	....	15	12
February	30.745	29.715	30.248	56.5	21	39.4	....	74.6	N.W.	5.67	....	14	4
March	30.483	29.285	29.984	56.0	17	38.8	....	74.3	N.W.	4.66	....	11	6
April	30.382	29.534	29.984	62.5	29	48.5	....	77.9	S.	4.69	....	12	4
May	30.314	29.369	29.929	74.0	43	60.1	....	76.7	S.	1.17	....	8	3
June	30.398	29.657	29.969	81.0	55	68.6	....	82.7	S.	5.50	....	12	3
For the year	....	....	....	....	....	....	....	....	....	....	....	....	....

* Including melted snow.
† Corrected for temperature and instrumental error only.

STATION, BARNEGAT CITY, N. J.

Latitude, 39° 46′ W.; Longitude, 74° 6′ E. Height of Barometer Cistern above Mean Sea Level, 22 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	BAROMETER.†			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equaled 0.01.	Cloudy Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.						
1882.													
July	30.293	29.563	29.988	92.5	58.7	72.5	....	80.2	S.	8.92	....	10	6
August	30.290	29.602	30.012	85.0	56.0	72.1	....	80.9	E.	8.21	....	10	12
September	30.228	29.477	30.014	83.0	49.0	68.5	....	81.8	E.	14.65	....	14	9
October	30.338	29.694	30.067	71.0	43.3	60.1	....	84.0	E.	4.16	....	11	10
November	30.509	29.681	30.122	70.0	24.4	43.3	....	76.0	N.	2.32	....	9	11
December	30.136	29.614	30.087	51.0	13.0	34.1	....	76.2	N.W.	3.36	....	8	5
1883.													
January	30.623	29.410	30.156	48.0	6.4	30.8	....	83.3	N.W.	8.91	....	14	19
February	30.784	29.654	30.241	60.0	17.0	35.2	....	76.6	N.W.	5.98	....	15	9
March	30.471	29.128	29.962	62.0	12.0	36.0	....	67.9	N.W.	3.28	....	9	7
April	30.444	29.598	29.989	61.3	32.0	46.0	....	79.5	S.W. & E.	3.93	....	17	12
May	30.359	29.439	29.949	75.0	40.2	56.5	....	80.5	E.	1.97	....	15	7
June	30.477	29.593	29.972	84.0	54.3	67.8	....	84.6	S.W.	4.09	....	11	3
For the year	....	....	....	....	....	....	....	....	....	....	....	....	....

* Including melted snow.
† Corrected for temperature and instrumental error only.

STATION, SANDY HOOK, N. J.

Latitude, 40° 28′ N.; Longitude, 74° W. Height of Barometer Cistern above Mean Sea Level, 28 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	Barometer.†			Thermometer.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow.	Days when Precipitation equaled 0.01.	Cloudy Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Monthly Range.						
1882.													
July	30.309	29.526	29.986	92.5	59.0	75.0	....	72.3	S.E.	2.35	....	7	6
August	30.299	29.595	30.016	88.0	61.0	73.3	....	74.6	S.E.	2.95	....	8	7
September	30.244	29.548	30.021	87.0	52.5	68.6	....	79.0	N.E.	11.48	....	13	9
October	30.327	29.677	30.069	76.0	46.0	59.9	....	77.9	N.E.	2.95	....	11	9
November	30.533	29.610	30.128	68.0	24.0	43.0	....	73.1	N.E.	1.51	....	9	7
December	30.428	29.594	30.082	53.0	3.0	33.3	....	77.9	W.	2.58	....	7	7
1883.													
January	30.619	29.509	30.166	84.0	3.5	28.4	....	81.6	N.E.	3.35	....	14	14
February	30.759	29.604	30.238	58.0	16.0	32.6	....	79.8	N.W.	4.22	....	15	7
March	30.466	29.244	29.913	62.0	10.0	34.4	....	73.4	N.W.	1.45	....	5	5
April	30.453	29.600	29.992	68.0	27.0	46.6	....	73.4	N.E.	5.79	....	13	5
May	30.379	29.474	29.918	84.0	40.0	58.6	....	73.8	S.E.	4.66	....	11	7
June	30.474	29.575	29.966	90.0	50.0	70.3	....	77.1	S.W. & S.E.	4.94	....	11	5
For the year	....	....	....	....	....	....	....	....	....	....	....	....	....

* Including melted snow.
† Corrected for temperature and instrumental error only.

QUINQUENNIAL DEATH-RATES.

REMARKS ON THE QUINQUENNIAL DEATH-RATES AND COMPARISONS OF THE NEXT TABLE.

The following table is intended to present, in a condensed form, (*a*) the death-rate by counties, including cities; (*b*) the death-rate of cities without the counties, and (*c*) the death-rate of the counties without the cities, for the first quinquennial period of the vital statistics of the State, as ending July, 1883. In addition, it presents the proportion of deaths under five years of age in the counties, including the cities, and in the cities without their counties. Also, the proportion of the chief preventable diseases to the entire deaths for the five years in the counties, including the cities, and in the cities without their counties.

Quetelet gives four chief rules as to such statistics:

I. Never have preconceived ideas as to what the figures are to prove.

II. Never reject a number that seems contrary to what you might expect, merely because it departs a good deal from the apparent average.

III. Be careful to weigh and record all the possible causes of an event, and do not attribute to one what is really the result of the combination of several.

IV. Never compare data which have nothing in common.

The following table, although exceedingly valuable for comparison to those who will accept it as a generalization and deal with it as to be studied alongside of modifying facts, is capable of being used in a plausible and yet utterly misleading way. Yet, in general, these modifying considerations are not difficult to estimate. In all large cities, and in large counties, for instance, the statistics are most informatory, since we are dealing with so large an aggregate of population as to neutralize or reduce to a minimum what might otherwise be a dis-

turbing factor. Thus the facts as to Newark and Jersey City are for five years those which concern about 600,000 of population each. The same kind of a statement for five years, as to a city of 5,000, represents 25,000 people. Even this is very valuable, but in so small a number some temporary cause of mortality would affect the average rate more than in a very large population. Again, if a city is situated in a populous county with many small villages, the contrast between its death-rate and that of the county, will not be marked. Sometimes, as in Hudson county, the condition of the whole county is such, or the population of the county is so small, as compared with its cities, as that the death-rate of the county is higher than that of its combined cities. This does not necessarily prove that the county is more unhealthy than the cities, but leads us to inquire whether the smallness of the population is such as that some local influence in some one district, or some local mortality or some presence of city institutions, has not magnified the death-rate. If so, we are able to allow for this and still get guide from our tables.

Atlantic county has its death-rate made higher than it would be, by incidental circumstances—the county being affected by some local epidemic largely in proportion because of its small population, and Atlantic City appearing high because, for four months of the year, it has about an eight-fold population, which would give more than a two-fold average for the year, and so reduce the death-rate one-half. Yet this merely necessitates that the city and county should keep or have an accurate analysis as to the residence of those that die, should study indications and should await facts over a sufficient long period of time to give it the correction of large numbers. Often it is well for those in localities of county or city to reckon the general death-rate without that of their own district, and so see how even the general death-rate may be magnified by their own locality. Thus the average death-rate of the State is largely increased by that of Hudson, Essex and Passaic counties, and that of the two last counties by their cities. When health officers and other local students of causes come to study them, if they will do it without having started to prove the healthfulness of their district, they will be able, on the one hand, to account for what may seem a relatively high statement of mortality, and, on the other, to detect the causes which are producing an excessive death-rate.

Always, too, it is to be borne in mind that the number of births and

the number of children under five years, or from five to twenty years of age, modifies results. It is hoped that our semi-decennial census will enable us to know just how many there are in the State, or in localities, of those various ages.

In our study of these statistics we should have paid more attention to the increase and decrease of population, but that the five years embrace a period both before and after a decennial census, and so the population of that census was, for the time, a fair basis. It is not necessary to discuss, in detail, various matters in this table, but we place it on record for permanent reference and for the study of local statisticians, health officers and physicians, as it is of great value as a guide.

The following table shows the quinquennial death-rates under five years, and from the chief preventable diseases for period ending June 30th, 1883:

QUINQUENNIAL DEATH-RATES.

	DEATHS AT ALL AGES.						
	Death-rate by counties.	Death-rate by cities.	Death-rate of counties without cities.	Comparison death-rate under 5 years by counties.	Comparison death-rate under 5 years by cities.	Comparison death-rate from chief preventable diseases by counties.	Comparison death-rate from chief preventable diseases by cities.
Atlantic county	18.48		15.80	41.03		20.26	
Atlantic City		22.24			*50.41		31.36
Bergen county	16.28		16.28	35 06		21.80	
Burlington county	15.91		13.24	34.84		21.82	
Bordentown		16.61			28.89		16.25
Burlington		19.31			31.18		20.17
Camden county	20.19		15.25	40.04		28.53	
Camden		20 58			41.35		30.21
Gloucester City		17.92			40.29		22.96
Cape May county	13.17		13.17	19.13		25.66	
Cumberland county	16.56		14.27	36.01		25.76	
Bridgeton		18.41			36.99		30.63
Millville		19.87			46.12		35.35
Essex county	21.26		13.63	40.61		27.66	
Newark		23.36			41.55		27.58
Orange		19.58			*43.46		24.13
Gloucester county	15.96		15.96	34.85		24.15	
Hudson county	24.79		31.90	45.58		29.82	
Bayonne		19.18			50.82		27.14
Harrison		20.12			44.67		30.40
Hoboken		25.58			49.07		32.21
Jersey City		24.26			45.31		30.04
Town of Union		27.11			53.59		41.23
Hunterdon county	13.74		13.74	28.94		20.49	
Mercer county	19.12		16.20	32.23		22 02	
Chambersburg		20 34			41.95		30.38
Trenton		20.54			37.89		22.92
Middlesex county	17.61		16.54	36.08		25.74	
New Brunswick		19.76			41.98		30.66
Monmouth county	17.12		17.12	35.25		22.49	
Morris county	17.04		13.76	32.32		22.22	
Morristown		19.59			29.25		19.25
Ocean county	13.82		13.82	31.53		20.82	
Passaic county	22.54		10.53	42.57		28.53	
Passaic		20.82			50.59		29.41
Paterson		24.51			43.08		28.92
Salem county	16 08		15.21	33.28		21.86	
Salem		18.91			33.05		19.87
Somerset county	15.68		15.68	28.92		21.31	
Sussex county	14.48		14.48	26.35		22.06	
Union county	18.59		14.65	38.37		25.73	
Elizabeth		19.65			42.57		22.21
Plainfield		16.49			39.10		25.22
Rahway		21.78			32.57		19.77
Warren county	16.34		12.21	36.49		22.11	
Phillipsburg		18.33			48.48		30.39
Totals	19.45	20 23	14.62	38.69	42.93	26.09	28.43

* See remarks as to health resorts, high birth-rate, etc.

NUMBER OF MARRIAGES, BIRTHS AND DEATHS, BY TOWNSHIPS.

FOR THE YEAR ENDING JUNE 30, 1884.

ATLANTIC COUNTY.

	M.	B.	D.
Absecon	6	18	6
Atlantic City	74	156	178
Buena Vista	1	15	10
Egg Harbor City	31	30	32
Egg Harbor Township	35	79	48
Galloway	11	36	27
Hamilton	7	34	27
Hammonton	24	57	47
Mullica	2	12	5
Weymouth	2	17	7
	193	449	387

BERGEN COUNTY.

	M.	B.	D.
Englewood	20	39	61
Franklin	21	44	36
Harrington	16	41	33
Hohokus	20	43	21
Lodi	15	79	71
Midland	8	20	30
New Barbadoes	47	95	68
Palisade	18	20	19
Ridgefield	9	66	65
Ridgewood	15	29	22
Saddle River	2	21	24
Union	10	78	48
Washington	4	54	34
	200	629	535

BURLINGTON COUNTY.

	M.	B.	D.
Bass River	4	29	11
Beverly	14	19	49
Bordentown	40	188	105
Burlington City	58	144	187
Chester	36	62	30
Chesterfield	5	20	17
Cinnaminson	19	58	24
Delran	21	17	23
Eastampton	2	17	10
Evesham	5	33	18
Florence	8	44	15
Little Egg Harbor	16	46	17
Lumberton	....	30	5
Mansfield	11	40	21
Medford	16	42	28
Mt. Laurel	....	20	27
New Hanover	10	43	31
Northampton	70	96	113
Pemberton	22	43	42
Randolph	4	9	7
Shamong	2	9	9
Southampton	9	54	21
Springfield	8	34	23
Washington	1	10	8
Westampton	2	5	6
Willingboro	....	9	10
Woodland	....	....	3
	378	1,061	810

CAMDEN COUNTY.

	M.	B.	D.
Camden City	498	807	932
Centre	8	49	41
Delaware	....	15	16
Gloucester City	89	145	116
Gloucester	17	60	66
Haddon	20	65	38
Stockton	13	63	37
Waterford	9	48	25
Winslow	14	52	25
	618	1,299	1,291

CAPE MAY COUNTY.

	M.	B.	D.
Cape May City	16	44	31
Dennis	15	52	14
Lower	9	35	33
Middle	21	62	35
Upper	17	28	31
	78	221	144

CUMBERLAND COUNTY.

	M.	B.	D.
Bridgeton	118	242	168
Commercial	14	17	33
Deerfield	13	28	15
Downe	12	26	24
Fairfield	18	74	35
Greenwich	6	21	18
Hopewell	12	42	30
Landis	65	135	117
Maurice River	16	55	22
Millville	100	240	142
Stoe Creek	5	12	10
	379	892	609

ESSEX COUNTY.

	M.	B.	D.
Belleville	15	48	43
Bloomfield	42	114	83
Caldwell	20	45	42
Clinton	11	58	36
East Orange	46	215	105
Franklin	6	30	27
Livingston	9	8	9
Milburn	7	44	19
Montclair	26	154	82
Newark	1,257	3,889	3,372
Orange	99	380	291
South Orange	14	66	51
West Orange	14	86	51
	1,566	5.137	4.211

GLOUCESTER COUNTY.

	M.	B.	D.
Clayton	13	59	28
Deptford	2	38	24
East Greenwich	3	14	15
Franklin	11	58	33
Glassboro	23	75	43
Greenwich	11	38	25
Harrison	10	41	19
Logan	4	33	27
Mantua	11	35	32
Monroe	12	47	29
South Harrison	4	16	12
Washington	12	34	24
West Deptford	3	29	29
Woodbury	26	69	47
Woolwich	20	54	40
	165	640	427

HUDSON COUNTY.

	M.	B.	D.
Bayonne	66	229	208
Guttenberg	12	88	88
Harrison	20	198	152
Hoboken	365	961	706
Jersey City	989	1,841	3,041
Kearny	6	44	85
North Bergen	15	42	218
Town of Union	92	226	187
Union	7	44	28
Weehawken	1	19	25
West Hoboken	58	202	111
	1,681	3,844	4,694

HUNTERDON COUNTY.

	M.	B.	D.
Alexandria	6	14	17
Bethlehem	10	48	85
Clinton	7	39	19
Delaware	15	48	48
East Amwell	15	25	20
Franklin	18	28	12
Frenchtown	9	21	14
High Bridge	17	41	28
Holland	15	84	19
Kingwood	8	88	15
Lambertville	32	71	89
Lebanon	21	49	88
Raritan	82	47	50
Readington	12	58	85
Tewksbury	24	89	26
Town of Clinton	10	26	16
Union	9	6	6
West Amwell	1	22	7
	256	684	429

MERCER COUNTY.

	M.	B.	D.
Chambersburg	42	188	124
East Windsor	19	89	22
Ewing	4	15	72
Hamilton	7	44	57
Hopewell	38	68	54
Lawrence	3	27	22
Millham	5	57	38
Princeton	18	71	72
Trenton	360	686	682
Washington	4	27	14
West Windsor	7	24	17
	497	1,191	1,124

MIDDLESEX COUNTY.

	M.	B.	D.
Cranbury	24	28	17
East Brunswick	28	82	59
Madison	1	15	11
Monroe	18	26	18
New Brunswick	149	462	397
North Brunswick	2	28	24
Perth Amboy	66	228	150
Piscataway	28	64	48
Raritan	16	39	47
Sayreville	14	18	28
South Amboy	33	98	76
South Brunswick	6	45	41
Woodbridge	9	91	72
	384	1,214	978

MONMOUTH COUNTY.

	M.	B.	D.
Atlantic	6	16	18
Eatontown	24	58	36
Freehold	46	72	70
Holmdel	9	26	14
Howell	25	74	35
Manalapan	12	34	17
Marlboro	6	24	21
Matawan	29	55	58
Middletown	15	78	74
Millstone	11	26	25
Neptune	72	141	125
Ocean	71	212	92
Raritan	35	86	68
Shrewsbury	64	157	110
Upper Freehold	26	71	46
Wall	41	148	59
	492	1,268	858

MORRIS COUNTY.

	M.	B.	D.
Boonton	28	54	50
Chatham	33	49	64
Chester	11	79	21
Hanover	12	56	108
Jefferson	....	16	19
Mendham	9	17	28
Montville	2	16	14
Morristown	54	165	142
Mt. Olive	17	37	21
Passaic	11	21	23
Pequannock	9	58	32
Randolph	47	189	94
Rockaway	29	95	90
Roxbury	18	48	21
Washington	22	72	31
	297	962	748

OCEAN COUNTY.

	M.	B.	D.
Berkeley	1	15	8
Brick	19	87	56
Dover	24	45	37
Eagleswood	9	8	8
Jackson	11	39	22
Lacey	5	22	14
Manchester	4	31	14
Ocean	3	9	11
Plumstead	18	48	28
Stafford	7	10	19
Union	11	24	9
	112	338	226

PASSAIC COUNTY.

	M.	B.	D.
Acquackanonk	4	29	25
Little Falls	7	23	18
Manchester	1	13	12
Passaic	71	194	154
Paterson	469	1,641	1,446
Pompton	11	34	32
Wayne	4	22	7
West Milford	17	16	25
	584	1,972	1,719

SALEM COUNTY.

	M.	B.	D.
Alloway	8	39	28
Elsinboro	....	8	11
Lower Alloways Creek	1	26	28
Lower Penn's Neck	10	12	16
Mannington	4	26	37
Oldmans	19	35	17
Pilesgrove	21	70	60
Pittsgrove	10	63	25
Quinton	3	43	23
Salem	44	126	78
Upper Penn's Neck	19	29	36
Upper Pittsgrove	19	16	22
	158	493	376

SOMERSET COUNTY.

	M.	B.	D.
Bedminster	8	26	28
Bernards	18	34	32
Branchburg	4	21	18
Bridgewater	50	155	104
Franklin	17	65	47
Hillsborough	19	40	42
Montgomery	8	36	28
North Plainfield	30	58	35
Warren	9	11	14
	163	446	348

SUSSEX COUNTY.

	M.	B.	D.
Andover	7	17	12
Byram	13	17	21
Frankford	14	15	27
Green	6	18	9
Hardyston	16	5	33
Hampton	6	2	19
Lafayette	12	8	10
Montague	1	6	2
Newton	26	30	33
Sandyston	6	11	11
Sparta	16	18	19
Stillwater	7	31	15
Vernon	9	31	22
Walpack	5	18	5
Wantage	24	27	50
	168	234	293

UNION COUNTY.

	M.	B.	D.
Clark	....	2	....
Cranford	4	20	19
Elizabeth	263	925	591
Fanwood	4	18	11
Linden	10	28	28
New Providence	4	11	20
Plainfield	31	163	132
Rahway	58	97	111
Springfield	7	14	9
Summit	20	41	32
Union	8	35	33
Westfield	7	47	35
	416	1,401	1,021

WARREN COUNTY.

	M.	B.	D.
Allamuchy		18	6
Belvidere	15	39	32
Blairstown	7	43	13
Franklin	10	30	15
Frelinghuysen	8	16	7
Greenwich	8	26	15
Hackettstown	26	59	36
Hardwick		8	6
Harmony	4	33	18
Hope	11	39	17
Independence	8	18	5
Knowlton	6	26	24
Lopatcong	2	42	14
Mansfield	9	15	27
Oxford	28	156	51
Pahaquarry	1	6	8
Phillipsburg	58	265	130
Pohatcong	7	34	20
Washington Borough	32	52	32
Washington Township	3	23	13
	238	938	489

TOTALS OF MARRIAGES, BIRTHS AND DEATHS FOR ALL THE COUNTIES.

	M.	B.	D.
Atlantic	198	449	337
Bergen	200	829	585
Burlington	373	1,061	810
Camden	618	1,299	1,291
Cape May	78	221	144
Cumberland	379	892	609
Essex	1,566	5,187	4,211
Gloucester	165	640	426
Hudson	1,631	3,844	4,694
Hunterdon	256	684	429
Mercer	497	1,191	1,124
Middlesex	384	1,214	978
Monmouth	492	1,268	858
Morris	297	962	748
Ocean	112	338	226
Passaic	584	1,972	1,719
Salem	158	498	376
Somerset	163	446	348
Sussex	168	234	293
Union	416	1,401	1,021
Warren	238	938	489
	8,968	25,263	21,716

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

COUNTIES. Statistical Divisions.	Deaths at all ages: Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total.	Population, Census of 1880.	Death-rate per 1,000.	Death-rates without cities of over 5,000.	Deaths under five in comparison with total deaths.
Atlantic	128	41	40	98	80	387	18,704	20.69	15.80	43.67
Bergen	110	54	46	171	152	533	36,786	14.54	14.54	30.65
Burlington	169	59	75	237	261	809	55,403	14.60	13.24	29.18
Camden	349	162	104	426	232	1,291	62,942	20.51	15.25	39.58
Cape May	32	13	10	36	52	144	9,765	14.75	14.75	31.25
Cumberland	141	65	46	175	178	609	37,687	16.16	14.27	33.82
Essex	1020	614	368	1432	761	4,211	189,929	22.17	13.63	34.80
Gloucester	76	50	38	133	122	427	25,886	16.49	16.49	29.51
Hudson	1257	686	413	1711	613	4,689	187,944	24.95	31.90	41.44
Hunterdon	66	32	39	125	165	429	38,570	11.12	11.12	22.84
Mercer	217	174	114	340	253	1,124	58,061	19.36	16.20	34.79
Middlesex	190	162	138	288	186	978	52,286	18.70	16.54	35.99
Monmouth	202	85	63	260	210	858	55,538	15.45	15.45	33.45
Morris	142	87	60	237	222	748	50,861	14.71	13.76	30.61
Ocean	44	22	16	69	71	226	14,455	15.63	15.63	29.20
Passaic	430	301	171	502	304	1,719	68,860	24.96	10.53	42.52
Salem	96	33	35	101	111	376	24,579	15.30	15.21	32.71
Somerset	50	26	29	125	115	348	27,162	12.81	12.81	21.87
Sussex	54	14	23	95	102	293	23,539	12.44	12.44	23.21
Union	252	124	118	300	226	1,021	55,571	18.37	14.65	36.83
Warren	104	44	49	152	137	489	36,589	13.36	12.21	30.26
Total	*5123	2848	1995	7007	4083	21,716	1,131,117	19.20	14.62	36.70

COUNTIES.	Principal causes of death: Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.	Comparative number of deaths from chief preventable diseases.
Atlantic	......	7	...	14	......	2	8	52	4	25	31	26	19	22	......	17	11	......	32	27	21.45
Bergen	19	18	...	6	1	3	18	50	9	60	33	31	23	47	4	36	10	......	81	86	22.24
Burlington	8	25	2	27	1	2	32	90	10	62	34	69	39	79	3	51	18	4	45	70	23.48
Camden	12	50	3	45	3	16	53	134	14	111	82	76	36	79	5	64	19	2	90	115	24.86
Cape May	......	1	...	5	......	......	3	16	2	14	7	13	2	17	......	12	6	......	11	10	17.36
Cumberland	2	17	...	6	1	2	13	64	10	57	49	38	20	55	3	47	13	......	41	57	17.73
Essex	34	113	...	99	53	10	226	488	39	486	347	232	194	274	13	162	103	4	353	279	24.60
Gloucester	4	10	...	19	1	3	8	24	4	35	26	24	16	36	3	35	8	......	33	37	18.97
Hudson	56	180	...	88	54	24	196	649	46	527	399	253	165	247	12	207	88	18	333	336	26.85
Hunterdon	4	2	1	10	2	1	13	22	7	49	15	38	23	65	4	26	12	......	26	43	13.75
Mercer	9	25	...	49	4	16	90	113	13	76	56	75	31	138	7	40	37	7	83	83	27.85
Middlesex	8	31	...	35	10	1	109	110	10	66	67	47	55	66	......	52	24	8	63	75	31.39
Monmouth	16	19	...	9	3	5	20	93	7	95	59	58	40	71	3	35	15	5	54	66	19.58
Morris	10	18	...	7	4	11	29	57	7	80	47	57	30	115	5	40	21	8	40	57	18.85
Ocean	2	9	...	3	1	3	4	16	1	26	14	11	7	22	3	18	10	2	6	26	18.14
Passaic	15	44	...	70	46	11	90	212	8	193	157	76	83	85	7	77	28	2	130	130	28.79
Salem	6	16	1	4	4	3	16	55	3	23	13	17	15	34	......	22	7	2	32	38	27.92
Somerset	3	7	...	11	1	1	11	18	9	24	20	27	18	48	1	18	14	3	32	24	15.23
Sussex	4	7	...	2	......	2	8	26	2	43	11	21	9	27	4	23	7	1	23	31	18.09
Union	16	26	...	33	......	......	62	127	9	78	87	77	45	87	2	50	16	2	58	64	26.05
Warren	2	12	...	5	......	......	18	36	7	44	44	34	22	50	2	23	17	4	32	45	15.34
Total	230	640	7	547	189	116	1027	2462	221	2174	1598	1324	892	1664	50	1075	484	62	1557	1658	24.40

* Of those that died under one year, 1,495 died under one month, of which 996 died in the larger cities.

Total deaths from consumption for the State, as compared with total deaths, 14.80.

Rates for short periods, or which deal with small numbers, are only approximate, since temporary causes may have been in operation, and small numbers do not eliminate or balance errors which practically disappear in large aggregates. So, five or ten years analyses are more important than any single year. The number of deaths before twenty, in proportion to the rest, are much more informatory as to local causes affecting health, than the total deaths. So, also, the number dying from the zymotic diseases, and especially from fevers, croup, diphtheria, diarrheal diseases, consumption, and brain and nervous diseases of children.

Return of Deaths from all Causes and Certain Specified Diseases, in the Cities of the State of New Jersey, of over 5,000 Population, for the Year ending June 30th, 1884.

CITIES HAVING OVER 5,000 POPULATION. Statistical Divisions.	DEATH AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of Children.	Diseases of heart and circulat'n.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intest'l diseases.	Cancer.	Ac'te rheumatism.	Consumption, M.	Consumption, F.	Comparative number of deaths of chief preventable diseases.
Atlantic County.																														
Atlantic City......	59	17	26	50	26	178	5,477	32.50	42.70	......	5	...	7	......	1	4	24	......	10	18	13	12	12	...	6	8	......	16	7	23.03
Burlington County																														
Bordentown.......	15	10	13	36	30	105	5,334	19.68	23.81	......	4	...	12	......	......	3	7	3	10	3	9	1	17	...	11	1	......	3	7	24.76
Burlington	39	11	7	42	37	137	7,237	18.93	36.50	1	3	...	1	......	......	7	19	......	7	5	13	13	14	...	7	2	......	10	9	22.63
Camden County.																														
Camden..	261	121	78	290	162	932	41,659	22.37	41.31	7	34	3	28	3	10	44	101	11	74	66	50	23	51	4	47	17	1	65	79	25.11
Gloucester City..	32	14	13	16	8	116	5,347	21.69	39.65	2	6	...	10	......	5	3	8	2	8	5	6	4	5	...	4	1	......	7	13	29.31
Cumberland Co.																														
Bridgeton	33	26	11	48	44	163	8,722	18.69	36.20	......	4	...	2	......	1	5	23	1	20	10	11	8	8	1	12	2	......	14	18	22.08
Millville.	38	8	13	45	38	142	7,660	18.54	32.39	1	4	...	2	......	......	2	13	4	15	8	5	3	9	...	10	3	......	12	18	15.49
Essex County.																														
Newark	836	503	295	1147	580	3,372	136,508	24.70	39.71	28	87	...	79	48	6	176	402	29	407	284	183	162	215	6	140	82	1	276	210	24.67
Orange...............	81	44	25	103	38	291	13,207	22.03	42.95	1	8	...	12	1	1	15	35	4	31	25	12	11	8	3	15	5	......	31	23	26.12
Hudson County.																														
Bayonne............	55	32	19	80	22	208	9,372	22.19	41.83	1	15	...	1	......	......	12	32	3	16	18	11	7	11	1	6	1	1	12	15	29.81
Harrison	39	17	13	66	17	152	6,898	22.03	36.84	5	9	...	3	1	......	9	15	1	19	21	7	2	7	...	5	4	1	14	11	27.63
Hoboken	268	84	62	283	68	706	30,999	22.13	41.36	2	24	...	12	5	1	23	95	12	65	78	46	25	29	2	37	10	7	44	59	23.23
Jersey City	794	473	277	1081	404	3,036	120,722	25.15	41.73	37	116	...	63	45	20	122	425	25	384	240	153	106	157	6	137	61	7	209	209	27.47
Town of Union...	43	22	6	45	20	137	5,849	23.42	47.44	2	8	...	1	......	2	5	32	2	11	8	10	3	9	1	4	3	2	14	8	37.23
Mercer County.																														
Chambersburg..	36	27	8	37	14	124	5,437	22.81	50.81	2	......	...	7	1	1	7	26	3	8	8	9	2	9	...	3	7	......	7	12	35.48
Trenton	131	119	66	192	107	632	29,910	21.13	39.56	3	21	...	33	2	14	61	62	9	44	31	32	16	52	3	24	18	1	51	42	31.49
Middlesex County.																														
New Brunswick.	81	65	69	109	68	397	17,166	23.13	36.77	2	14	...	7	2	......	66	51	4	27	28	18	27	21	...	16	11	2	26	27	35.77
Morris County.																														
Morristown.	27	17	9	44	42	142	6,837	20.77	30.98	......	3	...	......	......	......	11	11	1	6	14	14	5	14	...	5	7	......	8	19	17.60
Passaic County.																														
Passaic.	41	12	16	56	27	154	6,532	23.58	34.41	......	6	...	1	1	......	6	16	......	22	21	8	5	8	1	9	2	......	12	16	20.13
Paterson	363	280	141	403	250	1,446	51,031	28.33	44.47	12	34	...	68	43	10	82	185	8	155	127	59	75	64	6	61	24	2	121	108	30.43
Salem County.																														
Salem...	23	5	6	24	18	78	5,056	15.43	35.90	2	1	1	2	......	......	......	12	2	5	2	4	2	5	...	7	2	1	6	10	23.08
Union County.																														
Elizabeth..	164	85	69	177	96	591	28,229	20.93	42.13	11	13	...	22	......	......	42	76	6	47	57	42	25	41	1	30	13	1	31	35	27.92
Plainfield	32	10	16	39	35	132	8,125	16.25	31.82	1	4	...	2	......	......	11	15	......	6	10	9	9	18	...	5	......	......	8	10	25.00
Rahway...............	23	11	13	31	33	111	6,455	17.19	30.63	1	4	...	3	......	......	2	11	......	11	9	11	4	10	1	3	1	1	6	8	19.82
Warren County.																														
Phillipsburg.......	40	16	10	42	22	130	7,181	18.10	43.08	......	4	...	1	......	......	7	16	1	8	14	7	6	12	1	5	3	......	6	12	22.31
Total.	3497	2029	1281	4516	2206	13,812	576,950	23.59	40.61	121	431	4	369	152	72	725	1712	131	1416	1,110	746	558	808	37	609	288	28	1009	987	26.62

Total of consumption for all cities as compared with total deaths, 14.66.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

ATLANTIC COUNTY. POPULATION, 18,704. Statistical Divisions.	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Consumption—male.	Consumption—female.
Absecon	4	1		1		6	567										3			2									1
*Atlantic City	59	17	26	50	26	178	5,477	32.50			5		7		1	4	24		10	18	13	12	12		6	8		16	7
Buena Vista	2	1	2	2	3	10	885						1		1		2		1		1				1				
Egg Harbor City	11	4	2	8	7	32	1,232						3				6	1	2			4	1		1	1		3	3
Egg Harbor Township	13	6	1	14	14	48	3,568				1		1				6	1	3	8	1	1	3		5			3	8
Galloway	3	1	4	8	11	27	2,337									2			2	1	3		1		1	1		5	4
Hamilton	6	9	1	4	7	27	1,464						1				8		4	1			1		2			3	1
Hammonton	26	2	1	10	8	47	1,776				1					2	2	1	3	1	1	1	1		1	1		2	3
Mullica			2	1	2	5	717						1								1	1	1						
Weymouth	4		1		2	7	741										1	1					2						
Totals	128	41	40	98	80	387	18,704	20.69	......	......	7	......	14	......	2	8	52	4	25	31	20	19	22	......	17	11	......	32	27

* This and all other cities that are health resorts have an excessive death-rate by reason of temporary increase of population, which also includes a proportion of invalids above the average. Local Boards show this on their records.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

BERGEN COUNTY. Population, 36,786. Statistical Divisions.	Deaths at all ages. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	Principal causes of death. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Englewood	10	8	5	20	18	61	4,076	......	......	4	1	......	3	......	......	1	5	1	6	3	6	1	6	......	3	1	......	4	7
Franklin	5	8	3	10	10	36	2,206	......	......	3	......	......	......	1	1	3	2	1	2	3	2	1	3	......	3	......	......	3	2
Harrington	6	......	4	10	13	33	2,570	......	......	......	1	......	......	......	......	......	3	......	......	......	3	4	6	1	3	1	......	1	2
Hohokus	4	1	1	8	10	24	2,920	......	......	1	......	......	......	......	......	1	......	......	3	1	2	......	1	......	2	2	......	2	4
Lodi	17	10	4	18	22	71	4,071	......	......	......	6	......	......	......	......	2	11	1	11	5	5	......	7	......	6	1	......	3	2
Midland	5	1	7	11	6	30	1,591	......	......	2	3	......	......	......	......	3	1	......	6	1	1	2	1	......	2	......	......	3	2
New Barbadoes	15	8	6	26	13	68	4,248	......	......	1	3	......	1	......	1	3	6	3	10	4	3	4	5	2	1	2	......	3	4
Palisade	2	2	1	6	8	19	2,302	......	......	1	2	......	......	......	......	1	2	......	......	1	3	2	2	......	......	......	......	2	1
Ridgefield	22	4	6	20	13	65	3,952	......	......	2	......	......	1	......	......	1	9	3	8	6	2	2	2	......	5	......	......	2	4
Ridgewood	4	2	1	8	5	22	1,478	......	......	1	......	......	......	......	......	......	3	......	2	2	2	......	......	......	1	2	......	1	4
Saddle River	4	2	2	6	10	24	1,355	......	......	2	......	......	......	......	......	......	1	......	3	3	......	1	5	......	2	1	......	2	......
Union	12	5	5	17	9	48	3,164	......	......	1	......	......	1	......	1	2	4	......	4	3	1	3	5	......	4	......	......	3	3
Washington	4	3	1	11	15	34	2,853	......	......	1	2	......	......	......	......	1	3	......	5	1	1	3	4	1	4	......	......	2	1
Totals	110	51	46	171	152	535	36,786	14.54	......	19	18	......	6	1	3	18	50	9	60	33	31	23	47	4	36	10	......	31	36

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year Ending June 30th, 1884.

BURLINGTON COUNTY.
POPULATION, 55,403.

Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Bass River	4			5	2	11	1,006										1	1	1				1					1	2
Beverly	10	4	7	16	12	49	3,128				1		3			2	8	1	1	7	5	1	2		1	1	1	2	4
Bordentown	15	10	13	36	30	105	5,334	19.68			4		12			3	7	3	10	3	9	1	17		11	1		3	7
Burlington	39	11	7	42	37	137	7,237	18.93		1	3		1			7	19		7	5	13	13	14		7	2		10	9
Chester	6	1		11	12	30	2,856				1						4		5	3	4	1	3		2	1		5	3
Chesterfield	1	2	1	8	3	15	1,525						2				1		2		2				1			3	3
Cinnaminson	8	1	1	9	4	23	2,184				2						4	1	4		2				1	2		3	1
Delran	4	2	3	6	8	23	1,760								1	1	2		1	2	1	1	4		2	1		1	1
Eastampton	2	1	4	2	1	10	1,602									3			2				1					3	1
Evesham	3	1	3	5	6	18	566			1			1			1	2		2	1	2	2	1			1		1	1
Florence	4	1	1	8	1	15	1,528			1						1	2	1	1	1	1	1	1					1	1
Little Egg Harbor	3		4	4	6	17	1,881										1			1		2	4		1			1	2
Lumberton	2			1	2	5	1,689										2		1			1			1				
Mansfield	6	1	1	4	8	20	1,648									1	3		1		1	2	2		1			1	2
Medford	5	1		5	17	28	1,980			2	2						3	1	2		3	3	4	1		1			
Mt. Laurel	9	4	1	4	9	27	1,739				1					2	6		1	2	2	2	1		2	1		1	1
New Hanover	8	4	4	6	9	31	2,373			1			2			2	2	1	3	2	1		3		4	1	2	1	3
Northampton	14	7	11	40	40	113	4,630			1	5	1	2		1	7	9	1	4	6	10	3	3	2	4	3		4	20
Pemberton	7	4	3	8	19	42	2,885			1	3					1	5		7		1	2	4		5	1			4
Randolph		3	1	1	2	7	428						3												1	1		1	
Shamong	2		2	1	4	9	1,097									1	1		1		1	1	1		1				1
Southampton	2		3	4	12	21	2,269				1		1				1		1		2	1	5		2			2	1
Springfield	9		3	1	10	23	1,886				1			1			3		4		4		1			1	1		
Washington	1			2	5	8	389				1										1		1		1			1	2
Westampton	3		1	2		6	715										2			1	2				1				
Willingboro	1		1	5	2	9	743					1					1		1		2	1	1		2				
Woodland		1		1		2	325										1												1
Totals	169	59	75	237	261	809	55,403	14.60		8	25	2	27	1	2	32	90	10	62	34	69	39	79	3	51	18	4	45	70

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

CAMDEN COUNTY. POPULATION, 62,942. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
* Camden	264	121	78	290	162	932	41,659	22.87		7	34	3	28	3	10	44	101	11	74	66	50	23	51	4	47	17	1	65	79
Center	11	6	5	7	9	41	1,532			1	3						8		4	3	5	1	1		3			2	2
Delaware	2		1	8	5	16	1,481											1	5		1		2					1	1
Gloucester City	32	14	13	46	8	116	5,347	21.69		2	6		10		5	3	8	2	8	5	6	4	5		4	1		7	13
Gloucester	17	2	2	27	17	66	2,527			2	1		2			1	8		4	3	7	2	7	1	5	1		3	7
Haddon	5	2	3	10	13	33	2,551				2		3				3		4		8	3	6		3				2
Stockton	8	8	1	14	6	37	3,532				3		1		1	4	2		5	3	1		4		1			3	5
Waterford	3	5		10	7	25	2,149				1		1			1	2		5		1	3	3					3	3
Winslow	7	4	1	8	5	25	2,158										2		2	2	2				1		1	6	3
Totals	349	162	104	420	232	1,291	62,942	20.51		12	50	3	45	3	16	53	134	14	111	82	76	36	79	5	64	19	2	90	115

* Cities are generally more unhealthy than their death-rates indicate, since the population is in many of them much decreased for four months in the year, and thousands remove themselves instead of removing the evils which distress and sicken those who remain. Hence, in many of our cities, the death-rate for June, July, August and September, reckoned for the remaining population, would be a fair criterion of the health of locality, or at least should be considered for purposes of correction. So health laws are a great defense to all, but especially to the working classes of cities. See page 330.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

CAPE MAY COUNTY. Population, 9,765. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Cape May City	8	2	3	8	10	31	1,699									2	6		3	2	3		5		1	1		1	1
Dennis	3	2	2	6	1	14	1,812						3				1		1	1			1		1				3
Lower	10	3	3	7	9	33	1,977				1		1			1	4		4	2	1	1	5		1			3	1
Middle	7	3	2	4	19	35	2,575						1				2	2	5	2	6		3		4	3		2	1
Upper	4	3		11	13	31	1,702										3		1		3	1	3		5	2		5	4
Totals	32	13	10	36	52	144	9,765	14.75			1		5			3	16	2	14	7	13	2	17		12	6		11	10

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

CUMBERLAND COUNTY. POPULATION, 37,687. Statistical Divisions.	DEATHS AT ALL AGES.									PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Bridgeton	33	26	11	48	44	163	8,722	18.69	......	......	4	......	2	......	1	5	23	1	20	10	11	8	8	1	12	2	......	14	18
Commercial	11	4	3	10	3	33	2,265	......	......	......	1	......	......	1	......	......	5	3	......	4	1	1	......	......	3	......	......	2	3
Deerfield	3	......	1	5	6	15	1,643	......	......	......	......	......	......	......	......	......	2	......	......	......	1	......	3	1	3	1	......	......	1
Downe	8	5	1	5	5	24	1,687	......	......	......	......	......	1	......	......	......	3	......	1	3	1	......	2	......	2	......	......	3	3
Fairfield	8	2	2	7	16	35	3,215	......	......	......	2	......	......	......	......	2	4	......	5	......	3	1	4	......	2	3	......	1	1
Greenwich	4	2	1	5	6	18	1,245	......	......	......	......	......	......	......	......	......	1	1	1	1	1	1	4	1	1	......	......	......	1
Hopewell	3	3	2	8	13	30	1,764	......	......	......	......	......	......	......	......	......	2	......	2	4	2	2	5	......	3	2	......	1	1
Landis	25	13	10	33	36	117	6,005	......	......	......	6	......	......	......	1	4	10	1	11	18	8	2	16	......	10	2	......	6	8
Maurice River	7	1	1	6	7	22	2,374	......	......	1	......	......	1	......	......	......	......	......	2	1	4	2	1	......	1	......	......	1	2
Millville	38	8	13	45	38	142	7,660	18.54	......	1	4	......	2	......	......	2	13	4	15	8	5	3	9	......	10	3	......	12	18
Stoe Creek	1	1	1	3	4	10	1,107	......	......	......	......	......	......	......	......	......	1	......	......	......	1	......	3	......	......	......	......	1	1
Totals	141	65	46	175	178	609	37,687	16.16	......	2	17	......	6	1	2	13	64	10	57	49	38	20	55	3	47	13	......	41	57

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

ESSEX COUNTY.
POPULATION, 189,929.

Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.
Belleville	8	1	6	18	10	43	3,004	....	....
Bloomfield	18	15	5	23	21	83	5,748	....	....
Caldwell	5	3	3	18	12	42	3,167	....	....
Clinton	11	5	4	8	8	36	2,742	....	....
East Orange	13	8	11	40	33	105	8,349	....	....
Franklin	4	3	......	10	9	27	1,617	....	....
Livingston	......	2	......	5	2	9	1,401	....	....
Millburn	5	3	......	4	7	19	1,743	....	....
Montclair	19	13	7	23	18	82	5,147	....	....
Newark	836	503	295	1147	580	3,372	136,508	24.70	....
Orange	81	44	25	108	38	391	13,207	22.03	....
South Orange	6	6	7	20	12	51	3,911	....	....
West Orange	14	8	5	13	11	51	3,385	....	....
Totals	1020	614	368	1432	761	4,211	189,929	22.17	....

PRINCIPAL CAUSES OF DEATH.

Statistical Divisions.	Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Belleville	2	1	......	3	......	......	......	3	......	4	2	5	3	3	1	5	1	1	4	3
Bloomfield	......	2	......	1	1	1	6	8	......	7	8	1	3	7	1	4	3	......	6	4
Caldwell	1	1	......	1	......	1	1	3	......	2	5	5	1	5	......	1	1	......	5	7
Clinton	......	3	......	......	1	......	3	4	......	4	3	......	1	5	......	2	......	......	3	1
East Orange	1	6	......	3	......	......	1	10	3	10	4	5	8	13	......	2	7	1	13	7
Franklin	......	1	......	......	1	......	2	1	......	4	1	3	......	2	......	5	1	......	1	2
Livingston	......	1	......	......	......	......	......	1	......	1	......	1	1	1	......	......	......	......	......	3
Millburn	......	......	......	......	......	......	2	2	1	4	2	1	1	2	......	......	1	......	......	1
Montclair	1	1	......	......	......	1	10	7	......	7	5	7	1	9	1	4	1	......	5	7
Newark	28	87	......	79	48	6	176	402	29	407	284	183	162	215	6	140	82	1	276	210
Orange	1	8	......	12	1	1	15	35	4	31	25	12	11	8	3	15	5	......	31	23
South Orange	......	1	......	......	......	......	7	3	2	4	4	6	2	1	1	1	......	......	5	9
West Orange	......	1	......	......	1	......	3	9	......	1	4	3	......	3	......	3	1	1	4	2
Totals	34	113	......	99	53	10	226	488	30	486	347	233	194	274	13	182	108	4	353	279

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

GLOUCESTER COUNTY. POPULATION, 25,886. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.				Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Clayton	7	3	2	10	6	28	1,951	......	......	......	......	......	1	......	......	......	1	3	1	3	1	......	1	......	1	......	......	5	2
Deptford	3	4	2	9	5	24	1,520	......	......	1	1	......	1	......	......	......	3	......	6	2	2	......	2	......	1	......	......	......	1
East Greenwich	2	......	2	4	7	15	......	......	......	......	......	......	2	......	......	1	1	......	1	......	1	2	1	......	3	......	......	......	1
Franklin	5	7	2	9	9	33	2,480	......	......	3	......	......	1	1	1	1	2	......	3	1	......	3	1	......	2	1	......	4	2
Glassboro	9	4	2	11	17	43	2,088	......	......	......	......	......	......	......	......	2	3	......	6	5	......	1	4	......	6	......	......	4	3
Greenwich	2	1	1	11	7	25	2,598	......	......	......	1	......	......	......	......	......	1	......	1	......	3	3	2	1	......	1	......	1	2
Harrison	3	2	4	6	4	19	2,841	......	......	......	2	......	......	......	......	......	1	......	3	1	2	......	3	......	2	......	......	......	1
Logan	5	3	5	7	7	27	1,765	......	......	......	......	......	6	......	......	......	1	1	2	......	2	......	4	......	3	1	......	......	2
Mantua	10	7	1	6	8	32	1,718	......	......	......	1	......	2	......	1	......	6	......	......	6	......	......	5	......	2	......	......	4	2
Monroe	5	3	3	10	8	29	1,658	......	......	......	1	......	......	......	......	......	4	......	2	4	2	2	......	1	3	2	......	3	3
South Harrison	3	1	......	4	4	12	......	......	......	......	......	......	......	......	......	2	......	......	1	......	......	......	......	......	2	......	......	1	2
Washington	5	2	1	6	11	24	1,366	......	......	......	......	......	......	......	......	1	3	......	1	1	......	......	2	......	2	......	......	4	4
West Deptford	6	2	5	8	8	29	1,399	......	......	......	......	......	3	......	......	......	2	......	2	1	3	2	1	......	2	1	......	1	3
Woodbury	7	2	4	21	13	47	2,226	......	......	......	2	......	1	......	......	......	2	......	1	......	2	3	5	......	5	......	......	4	7
Woolwich	5	9	4	10	12	40	1,974	......	......	......	2	......	2	......	1	1	4	......	5	2	6	......	5	......	1	2	......	2	2
Totals	76	50	38	133	132	427	25,886	16.49	......	4	10	......	19	1	3	8	34	4	35	26	24	16	26	2	35	8	......	32	37

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

HUDSON COUNTY. POPULATION, 187,944. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Bayonne	55	32	19	80	22	208	9,372	22.19	....	1	15	......	1	......	......	12	32	3	16	18	11	7	11	1	6	1	1	12	15
Guttenberg	13	4	3	12	1	33	1,206	....	....	......	......	......	......	......	......	4	6	......	2	3	2	......	......	1	2	......	......	1	5
Harrison	39	17	13	66	17	152	6,898	22.03	....	5	9	......	3	1	......	9	15	1	19	21	7	2	7	......	5	4	1	14	11
Hoboken	208	84	62	263	65	706	30,999	22.13	....	2	24	......	12	5	1	23	95	12	65	78	46	25	29	2	37	10	7	44	59
Jersey City	791	473	277	1681	404	3,036	120,722	25.15	....	37	116	......	63	45	20	122	425	25	384	240	153	166	157	6	137	61	7	209	209
Kearny	10	4	5	10	6	35	777	....	....	......	......	......	......	1	......	3	3	......	3	2	3	......	1	......	......	4	......	2	1
North Bergen	47	19	6	91	55	218	4,268	....	....	3	1	......	3	......	......	1	17	2	12	12	10	16	30	......	9	3	......	26	17
Town of Union	43	22	6	45	30	137	5,849	23.42	....	2	8	......	1	......	2	5	32	2	11	8	10	3	9	1	4	3	2	14	8
Union	4	9	4	8	3	28	1,310	....	....	3	1	......	......	......	......	3	2	......	3	3	1	2	......	......	1	......	......	3	3
Weehawken	6	3	5	5	6	25	1,102	....	....	......	1	......	......	......	......	4	3	......	4	1	1	2	1	1	......	1	......	......	1
West Hoboken	38	19	13	30	11	111	5,441	....	....	1	5	......	5	2	1	10	19	1	8	13	9	2	2	......	6	1	......	8	7
Totals	1257	686	413	1711	613	4,689	187,944	24.95	....	56	180	......	88	54	24	196	649	46	527	399	253	165	247	12	207	88	18	333	336

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

HUNTERDON COUNTY. Population, 38,570. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.				Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Alexandria		3	4	3	7	17	1,324				1		2			1	1		1		2	2	4						1
Bethlehem	3	1	5	14	12	35	2,530										1	1	6	1	5	2	4		3	3		2	3
Clinton borough	2	1	3	4	6	16	842			1							2		2	2	1	1	1					2	3
Clinton township	4	1		4	10	19	2,133									1			2		3	2	5					2	1
Delaware	11	2	2	12	16	43	3,092									3	3		3	2	5	1	4		2	1		4	8
East Amwell	2	4		6	8	20	1,696						1			2			3	1	3		4		2				
Franklin		1		5	5	12	1,338												2		2	2	2					2	2
Frenchtown	2	2		3	6	14	1,039									1	1	1		2	1	2	2		1	1		2	
High Bridge	5		1	10	7	23	2,309										1	1		2	2		4		1			1	5
Holland	3	1	4	1	10	19	1,886			2						3			5	1	4	1	1		1			2	
Kingwood			1	5	9	15	1,694																5						5
Lambertville	8	1	7	9	14	39	4,183			1		1	2	2		1	5		2	1		2	9		3			1	4
Lebanon	7	5	1	12	8	33	2,699								1		4		10		2		2	1	6	1		2	3
Raritan	4	4	4	15	23	50	4,188				1		2				2	2	5	1	3	3	9	2	1	2		6	2
Readington	6	3	1	10	15	35	3,103									1	1		2	2	2	1	7		4	1			5
Tewksbury	6	2	5	8	5	26	2,108						3					1	4		2	4	2	1	2	2			1
Union	1	1	1	1	2	6	1,164										1		1										
West Amwell	2			3	2	7	1,039											1	1		1					1			
Totals	66	32	39	125	165	429	38,570	11.12		4	2	1	10	2	1	13	22	7	49	15	38	23	65	4	26	12		26	43

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

MERCER COUNTY. Population, 58,061. Statistical Divisions.	Deaths at all ages. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.
Chambersburg	36	27	8	37	14	124	5,437	22.81	....
East Windsor	6	......	......	7	7	22	2,271	....	....
*Ewing	7	2	6	34	23	72	2,412	....	....
Hamilton	11	1	5	15	22	57	3,370	....	....
Hopewell	4	4	3	18	25	54	4,462	....	....
Lawrence	......	3	5	5	9	22	3,174	....	....
Millham	10	7	9	8	4	38	....	....	....
Princeton	9	10	10	16	26	72	4,348	....	....
Trenton	131	119	66	193	107	632	29,910	21.13	....
Washington	2	1	......	3	8	14	1,281	....	....
West Windsor	1	....	2	5	8	17	1,396	....	....
Totals	217	174	114	340	2[illegible]8	1,124	58,061	19.36	....

Statistical Divisions.	Principal causes of death. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Chambersburg	2	......	......	7	1	1	7	26	3	8	8	9	2	9	......	3	7	......	7	12
East Windsor	......	......	......	......	......	......	......	......	......	2	2	2	1	5	1	1	2	......	1	......
*Ewing	......	......	......	......	......	......	2	3	......	3	2	1	......	35	......	4	2	1	7	6
Hamilton	1	......	......	......	......	......	3	4	......	7	2	6	......	5	......	1	1	......	5	5
Hopewell	......	......	......	3	1	......	......	2	......	1	1	5	3	10	......	2	5	3	6	6
Lawrence	......	......	......	2	......	......	2	1	......	......	2	3	1	4	......	2	1	1	1	......
Millham	1	1	......	2	......	1	12	4	......	1	3	......	2	5	......	......	......	......	2	......
Princeton	......	1	......	2	......	......	3	9	1	8	4	10	4	9	2	3	1	......	1	7
Trenton	3	21	......	33	2	14	61	62	9	44	31	32	18	52	3	24	18	1	51	42
Washington	......	......	......	......	......	......	......	1	......	2	1	3	......	1	1	......	......	1	2	1
West Windsor	2	2	......	......	......	......	......	1	......	......	......	4	......	3	......	......	......	......	......	4
Totals	9	25	......	49	4	16	90	113	13	76	56	75	31	138	7	40	37	7	83	88

* Ewing township includes Asylum. See Adult Brain column.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

MIDDLESEX COUNTY. Population, 52,286. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Cranbury	......	2	2	4	8	17	1,599	......	......	......	......	......	......	......	......	1	......	......	3	1	......	2	1	......	5	......	......	1	2
East Brunswick	6	9	10	13	18	59	3,272	......	......	1	1	......	3	......	......	10	2	1	1	3	5	3	4	......	4	1	......	4	4
Madison	5	1	1	3	1	11	1,662	......	......	......	......	......	......	......	1	1	1	......	......	1	1	1	......	......	1	......	......	......	4
Monroe	1	4	1	3	4	13	3,017	......	......	......	......	......	......	......	......	......	4	......	......	1	......	1	2	......	......	1	1	1	......
New Brunswick	81	65	69	109	68	397	17,166	23.13	......	2	14	......	7	2	......	66	51	4	27	28	18	27	21	......	16	11	2	26	27
North Brunswick	3	2	5	7	7	24	1,251	......	......	......	......	......	1	......	......	3	1	......	2	1	1	2	3	......	1	2	......	2	2
Perth Amboy	43	33	19	42	10	150	4,808	......	......	2	9	......	17	1	......	11	14	3	5	20	3	6	6	......	5	2	......	5	9
Piscataway	4	5	6	22	11	48	3,242	......	......	......	2	......	1	......	......	2	2	......	6	1	3	2	1	......	4	2	......	3	5
Raritan	4	5	5	17	16	47	3,789	......	......	......	2	......	1	......	......	3	8	......	4	1	7	2	4	......	4	1	......	3	4
Sayreville	7	5	1	10	......	23	1,930	......	......	......	1	......	......	4	......	......	3	......	1	2	2	......	1	......	......	......	......	3	2
South Amboy	16	14	6	25	15	76	3,648	......	......	2	2	......	1	......	......	9	7	1	4	2	4	2	11	......	5	......	......	8	6
South Brunswick	4	4	3	15	14	41	2,803	......	......	......	1	......	1	......	......	1	2	......	......	3	1	4	8	......	3	2	......	4	5
Woodbridge	14	13	10	18	14	72	4,099	......	......	1	2	......	3	3	......	2	15	1	13	3	2	3	4	......	4	2	......	3	5
Totals	190	162	138	288	186	978	52,286	18.70	......	8	34	......	35	10	1	109	110	10	66	67	47	55	66	......	52	24	3	63	75

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divsions of the State of New Jersey, for the Year ending June 30th, 1884.

MONMOUTH COUNTY. Population, 55,538. Statistical Divisions.	Deaths at all ages. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	Principal causes of death. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Atlantic	1	4		6	8	18	1,743			1	1				2		1		2	2	1	1			1			1	1
Eatontown	7	2	3	12	12	36	2,642				2		2				4		5	1	1	1	5		3	1		3	5
Freehold	12	5	5	29	18	70	4,302			2	1					2	6		6	3	10	5	9		2	1	2	6	5
Holmdel	4	1	1	1	7	14	1,575			1							1			1	2	2			1				2
Howell	1	6		15	12	35	3,374			4								1	4	1	6	2	5		1	1		2	2
Manalapan	2	1	2	6	6	17	2,175										1		1	3	2				1	2		3	3
Marlboro	3	2	5	5	6	21	2,193							2			1		2	1	1				1			1	1
Matawan	13	4	6	18	12	53	2,699				1					1	5	3	7	5	2	2	6		1			6	5
Middletown	25	6	3	22	17	74	5,059			2	1						6		10	4	11	1	6		4	2		2	6
Millstone	4	3	1	4	13	25	2,050						1				2		3	1	4	2	1		4			1	1
Neptune	35	11	8	44	27	125	4,187			2	7					6	18	3	12	9	12	4	13		2	5		4	4
Ocean	29	10	3	24	22	92	6,027			1					1	1	16		10	7	12	3	6	2	1	1	1	4	7
Raritan	17	8	3	22	13	63	3,891			3	2		2	1	1	2	7		6	7	6		2		5		1	7	4
Shrewsbury	23	11	15	34	26	110	6,536				2		3			3	7		16	7	11	5	8	1	2	2		9	15
Upper Freehold	11	1	4	9	21	46	3,236						1		1		6		8	1	3	4	5		2		1	2	
Wall	15	10	4	10	20	59	3,829				2					5	12		3	6	4	8	5		4			3	
Totals	202	85	63	260	240	858	55,538	15.45		16	19		9	3	5	20	93	7	95	59	88	40	71	3	35	15	5	54	66

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

MORRIS COUNTY. Population, 50,861. Statistical Divisions.	Deaths at all ages. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	Principal causes of death. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Boonton	11	9	2	16	12	50	2,682	......	......	1	2	......	......	2	1	1	6	......	3	2	5	1	3	......	6	1	1	4	3
Chatham	6	10	6	22	20	64	4,276	......	......	......	2	......	1	1	1	5	6	......	3	2	7	5	6	......	4	3	......	2	9
Chester	3	4	2	2	10	21	2,337	......	......	......	......	......	......	......	......	4	1	......	4	1	1	1	4	......	2	1	......	......	......
* Hanover	5	1	6	48	43	103	4,138	......	......	1	1	......	......	......	......	2	2	1	5	1	6	4	57	......	4	2	2	3	2
Jefferson	5	1	3	5	5	19	1,792	......	......	......	......	......	......	......	......	......	1	1	6	3	......	1	2	......	......	......	......	1	2
Mendham	4	4	1	8	10	23	1,526	......	......	......	1	......	1	......	......	......	1	......	1	......	2	......	3	......	4	1	......	2	1
Montville	3	1	1	4	4	14	1,270	......	......	2	......	......	......	1	......	......	2	1	4	......	......	1	......	......	......	......	......	1	1
Morristown	27	17	9	44	42	142	6,837	20.77	......	......	3	......	......	......	......	11	11	1	6	14	18	5	14	......	5	7	......	8	19
Mt. Olive	5	3	1	7	5	21	1,982	......	......	......	2	......	......	......	......	1	2	......	2	......	2	1	1	1	1	1	......	1	......
Passaic	5	4	1	4	9	23	1,896	......	......	......	1	......	......	......	......	......	......	......	8	3	1	3	3	......	1	......	......	......	......
Pequannock	9	5	4	7	7	32	2,239	......	......	1	1	......	......	......	2	......	5	1	2	4	2	2	......	1	3	......	......	2	4
Randolph	24	9	13	28	20	94	7,700	......	......	4	1	......	1	......	......	5	9	......	12	10	5	1	11	......	6	2	......	6	5
Rockaway	22	17	5	24	19	87	7,366	......	......	1	3	......	1	......	6	......	11	......	20	1	2	4	6	2	3	3	......	6	4
Roxbury	5	2	2	7	8	24	2,139	......	......	......	......	......	......	......	......	......	......	1	3	2	3	......	1	......	2	......	......	2	2
Washington	8	......	4	11	8	31	2,681	......	......	......	1	......	3	......	1	......	......	1	1	4	3	1	4	1	......	......	......	2	5
Totals	142	87	60	237	222	748	50,861	14.71	......	10	18	......	7	4	11	29	57	7	80	47	57	30	115	5	40	21	3	40	57

*** Hanover township includes Asylum. See Adult Brain column.**

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

OCEAN COUNTY. Population, 14,455. Statistical Divisions.	Deaths at all ages. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	Principal causes of death. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal disease.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Berkeley	2			3	3	8	683				1					1			1			1			2	1			
Brick	9	8	3	21	14	56	2,990				8						8		10	2	1	2	5	2	4	3		3	8
Dover	7	1	3	10	16	37	2,439			1			1	1	2				8	3	2		7	1	4	1			3
Eaglewood	2			2	4	8	592				1									1			1			1			2
Jackson	4	5	4		8	22	1,803						1				2		2	2	2	1	1		1		2	1	2
Lacey	4	1		6	3	14	814						1				1		3	1					4	1			
Manchester	5	1	1	4	2	14	1,057				2						1		1	2			1			2			2
Ocean	1	2	1	3	4	11	484				1					1	1		2		2		1						1
Plumstead	9	2	1	8	8	28	1,561			1					1		2	1	3	2	1	2	3		1			1	3
Stafford		2	2	9	5	19	1,008				1					2				1	1		1		2	1		1	1
Union	1		1	3	4	9	1,024										1		1		1	1	1						4
Totals	44	22	16	69	71	226	14,455	15.63		2	9		3	1	3	4	16	1	26	14	10	7	21	3	18	10	2	6	26

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

PASSAIC COUNTY. POPULATION, 68,860. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Acquackanonk	3	......	4	3	6	25	1,781	....	....	1	2	......	......	......	......	......	3	......	4	1	1	1	5	......	2	......	......	......	3
Little Falls	6	2	2	5	3	18	1,404	....	....	......	......	......	......	......	1	......	3	......	1	1	1	1	1	......	2	1	......	......	1
Manchester	2	2	1	3	4	12	1,513	....	....	......	......	......	......	1	......	......	1	......	2	1	2	......	1	......	1	......	......	1	1
Passaic	41	12	16	56	27	154	6,532	23.58	....	......	6	......	1	1	......	6	16	......	22	21	8	5	6	1	9	2	......	12	18
Paterson	363	250	141	403	250	1,446	61,031	28.33	....	12	34	......	68	43	10	52	185	8	155	127	69	75	64	6	61	24	2	121	108
Pompton	......	1	5	11	6	32	2,251	....	....	2	......	......	1	1	......	......	3	......	6	5	2	......	3	......	2	......	......	1	2
Wayne	9	......	......	4	5	7	1,757	....	....	......	2	......	......	......	......	......	......	......	2	......	......	......	1	......	......	......	......	2	2
West Milford	6	4	2	7	6	25	2,091	....	....	......	......	......	......	......	......	2	1	......	1	1	3	1	2	......	......	1	......	2	4
Totals	430	301	171	502	304	1,719	68,860	24.96	....	15	44	......	70	46	11	90	212	8	193	157	76	83	85	7	77	28	2	139	139

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

SALEM COUNTY. POPULATION, 24,579. Statistical Divisions.	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute Rheumatism.	Consumption—male.	Consumption—female.
Alloway	6	2	3	5	12	28	1,917	...	...	...	2	...	...	...	...	3	1	...	4	...	2	2	4	...	1	1	...	1	2
Elmboro	3	3	1	1	3	11	570	...	...	...	...	...	...	1	2	...	2	...	1	...	...	...	2	...	...	...	...	...	...
Lower Alloways Creek	5	...	3	8	7	23	1,373	...	...	2	...	...	...	...	...	2	3	...	1	...	1	2	1	...	3	1	...	1	4
Lower Penn's Neck	3	...	1	6	6	16	1,334	...	...	...	1	...	...	1	...	1	2	...	...	...	1	1	2	...	1	1	...	3	...
Mannington	7	4	3	14	8	37	2,230	...	...	2	1	...	...	...	1	...	5	...	2	...	2	3	2	...	2	1	...	3	3
Oldmans	4	1	...	6	6	17	...	...	...	...	1	...	1	...	...	...	2	...	...	2	2	...	2	...	1	...	...	...	3
Pilesgrove	12	5	10	13	20	60	3 497	...	...	...	5	...	...	...	...	3	10	1	5	4	1	...	9	...	4	1	...	7	6
Pittsgrove	3	3	4	7	8	25	1,778	...	...	...	2	...	...	...	...	3	3	...	2	...	...	2	2	...	1	...	...	3	3
Quinton	8	4	1	5	5	23	1,390	...	...	...	...	...	...	1	...	...	6	...	2	1	...	...	1	...	...	...	...	3	3
Salem	23	5	16	24	18	78	5,056	15.43	...	2	1	1	2	...	...	...	12	2	5	2	4	2	5	...	7	2	1	6	10
Upper Penn's Neck	13	6	...	4	10	36	3,361	...	...	...	1	...	...	...	...	4	8	...	1	3	3	...	3	...	1	...	...	3	2
Upper Pittsgrove	3	...	3	8	8	22	2,073	...	...	...	2	...	1	1	...	...	1	...	...	1	1	3	1	...	1	...	1	2	2
Totals	90	33	35	101	111	376	24,579	15.30	...	6	16	1	4	4	3	16	55	3	23	13	17	15	34	...	22	7	2	32	38

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

SOMERSET COUNTY. POPULATION, 27,162. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH.																			
	Under one.	One to five	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.				Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Bedminster	3	1	6	9	7	28	1,812	......	......	......	......	......	3	1	......	......	1	1	1	1	4	......	2	......	......	......	1	5	3
Bernards	3	6	5	8	9	33	2,622	......	......	......	1	......	6	......	1	4	1	1	4	1	......	3	4	......	......	3	......	3	1
Branchburg	2	1	2	10	3	18	1,316	......	......	......	1	......	......	......	......	1	......	1	1	1	......	......	5	......	......	1	......	3	1
Bridgewater	20	7	6	45	26	104	7,997	......	......	2	2	......	......	......	......	1	6	3	6	10	9	2	9	1	3	6	1	9	11
Franklin	6	2	2	15	15	47	5,818	......	......	......	......	......	2	......	......	1	3	1	3	3	1	3	11	......	3	1	......	2	5
Hillsborough	4	2	2	11	23	42	3,248	......	......	1	2	......	......	......	......	......	1	......	2	1	6	1	9	......	4	2	......	6	......
Montgomery	3	3	......	4	18	28	1,928	......	......	......	......	......	......	......	......	1	3	1	3	......	......	5	2	......	4	1	1	1	......
North Plainfield	7	4	2	15	7	35	5,217	......	......	......	1	......	......	......	......	3	1	......	3	3	7	2	4	......	2	......	......	2	2
Warren	2	......	1	7	4	14	1,204	......	......	......	......	......	......	......	......	......	3	1	1	......	......	2	2	......	2	......	......	1	1
Totals	50	26	29	125	115	348	27,162	12 81	......	3	7	......	11	1	1	11	18	9	24	20	27	18	48	1	18	14	3	32	24

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

SUSSEX COUNTY. Population, 23,539. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Andover	1	.....	1	6	4	12	1,150	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....	1	3	.....	.....	.....	2
Byram	3	3	2	9	4	21	1,406	.....	.....	1	.....	.....	.....	.....	.....	2	3	.....	2	.....	2	1	2	.....	1	.....	.....	.....	3
Frankford	6	.....	2	3	16	27	1,682	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	4	.....	2	.....	2	.....	3	.....	.....	5	1
Greene	4	.....	.....	4	1	9	727	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hardyston	13	1	1	8	12	35	2,645	.....	.....	1	.....	.....	.....	.....	.....	.....	3	.....	11	2	.....	1	2	.....	.....	.....	.....	5	3
Hampton	2	.....	.....	7	8	17	895	.....	.....	1	.....	.....	.....	.....	.....	1	1	.....	.....	.....	5	1	5	.....	1	1	.....	.....	.....
Lafayette	.....	1	1	6	2	10	781	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2	.....	.....	.....	1	.....	2	.....	.....	.....	3
Montague	1	.....	.....	1	.....	2	1,022	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Newton	7	2	3	14	11	38	2,513	.....	.....	.....	1	.....	1	.....	.....	2	3	.....	3	3	2	2	2	.....	2	3	.....	6	6
Sandyston	1	.....	2	2	6	11	1,195	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	4	.....	.....	.....	1	.....	2	.....	.....	.....	2
Sparta	2	4	2	7	4	19	2,274	.....	.....	.....	.....	.....	.....	.....	.....	1	3	.....	2	2	2	.....	3	.....	.....	1	.....	1	1
Stillwater	2	2	.....	6	5	15	1,502	.....	.....	1	1	.....	.....	.....	.....	1	1	.....	.....	1	1	1	1	.....	3	.....	.....	2	1
Vernon	3	1	3	8	7	22	1,811	.....	.....	.....	1	.....	1	.....	1	.....	3	.....	3	.....	1	1	.....	1	3	1	.....	.....	2
Walpack	2	.....	.....	1	.....	5	575	.....	.....	.....	1	.....	.....	.....	.....	.....	2	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wantage	7	.....	6	13	23	50	3,361	.....	.....	.....	2	.....	.....	.....	1	.....	2	1	9	1	5	2	8	2	3	1	.....	4	7
Totals	54	14	23	95	102	293	23,539	12.44	.....	4	7	.....	2	.....	2	8	26	2	43	11	21	9	27	4	23	7	1	23	31

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1884.

UNION COUNTY. Population, 55,571.

Statistical Divisions.	Deaths at all ages: Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880.	Death-rate per 1,000.	Deaths under five in comparison with total deaths.
* Clark	......	......	......	......	......	......	353	......	......
Cranford	3	3	3	6	4	19	1,184	......	......
Elizabeth	164	85	69	177	96	591	28,229	20.93	......
Fanwood	1	1	1	4	4	11	1,167	......	......
Linden	8	3	5	11	6	33	1,889	......	......
New Providence	3	2	5	3	6	20	781	......	......
Plainfield	32	10	16	39	35	132	8,125	16.26	......
Rahway	23	11	13	31	33	111	6,455	17.19	......
Springfield	1	1	......	1	6	9	844	......	......
Summit	2	4	1	8	9	24	1,910	......	......
Union	14	......	4	7	16	41	2,418	......	......
Westfield	6	4	1	13	11	35	2,216	......	......
Totals	252	124	118	300	226	1,021	55,571	18.37	......

Principal causes of death:

Statistical Divisions.	Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
* Clark	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Cranford	......	......	......	1	......	......	1	6	2	2	......	1	......	2	......	4	......	......	......	......
Elizabeth	11	13	......	22	......	......	42	76	6	47	57	42	25	41	1	30	13	1	31	35
Fanwood	......	......	......	......	......	......	......	......	......	......	1	......	......	4	......	1	......	......	1	2
Linden	......	......	......	3	......	......	2	4	......	2	......	5	3	2	......	2	......	......	2	1
New Providence	......	......	......	1	......	......	1	......	......	3	5	2	1	......	......	1	......	......	1	1
Plainfield	1	4	......	2	......	......	11	15	......	6	10	9	9	18	......	5	......	......	8	10
Rahway	1	4	......	3	......	......	2	11	......	11	9	11	4	10	1	3	1	1	6	8
Springfield	......	......	......	......	......	......	......	1	......	......	1	......	2	1	......	......	1	......	2	......
Summit	2	1	......	1	......	......	......	4	1	1	1	2	......	1	......	1	1	......	3	1
Union	1	2	......	......	......	......	3	6	......	3	......	2	......	4	......	1	......	......	1	3
Westfield	......	2	......	......	......	......	......	4	......	3	3	3	1	4	......	2	......	......	3	3
Totals	16	26	......	33	......	......	62	127	9	78	87	77	45	87	2	50	16	2	58	64

* Clark township too late for tabulation.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year Ending June 30th, 1884.

WARREN COUNTY. Population, 36,589. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1880	Death-rate per 1,000.	Deaths under five in comparison with total deaths.	PRINCIPAL CAUSES OF DEATH. Remittent fever, &c.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Diarrheal diseases.	Puerperal.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Erysipelas.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Consumption—male.	Consumption—female.
Allamuchy	1		1	3	1	6	648			1									1	1								1	1
Belvidere	5	1	1	14	11	32	1,773				1					1	2		7	1		2	4		2	1		5	2
Blairstown	1	1	2	3	6	13	1,458										1			1	1	1	2		2			3	
Franklin		1	1	4	9	15	1,529				1		1						1		2		1			2		3	1
Frelinghuysen	1			3	3	7	1,042											1	1		1	1	1		1				
Greenwich	2	1	1	4	7	15	2,554											1	1	1	2		2		2			2	2
Hackettstown	7	6	6	9	8	36	2,502			1	1		2			1	3		4	6	4	2	4	1				1	4
Hardwick	1			1	4	6	583														1		1						2
Harmony	1	4	1	6	5	18	1,350										1		2	2		2	2					1	5
Hope	6		1	2	8	17	1,569										2		3	1	2		3						2
																													2
Independence			1	2	2	5	1,018				1								1				1						
Knowlton	5		3	6	10	24	1,476				1						1		1	3		3	2		4			1	2
Lopatcong	3	1	1	4	5	14	1,591									1			2	1	2	1	2		1	1		1	
Mansfield	4		3	9	11	27	1,709										1	1	1	2	3	1	4		1	3		5	1
Oxford	14	4	9	14	8	51	4,594						1			3	3	1	5	5	5		4		3	3	3	1	2
																											1		2
Pahaquarry	2		2	2	2	8	418												2	2		1							
Phillipsburg	40	16	10	42	22	130	7,161	18.10			4		1			7	16	1	8	14	7	6	12	1	5	3		6	12
Pohatcong	1	3	2	8	6	20					1					2	1		2	2	1	1	3					1	3
Town of Washington	9	5	2	12	4	32	2,142				2					3	5	2	1	1	2	1	2		2	1		1	1
Washington township	1	1	2	4	5	13	1,452												1	1	1					3			1
Totals	104	44	49	152	137	489	36,589	13.36		2	12		5			18	36	7	44	44	34	22	50	2	23	17	4	32	46

SYNOPSIS OF VITAL RETURNS AND COMMENTS ON SPECIAL DISEASES.

The records for the statistical year ending June 30th, 1884, as shown by the tables accompanying this report, give an aggregate of 8,968 marriages, 25,263 births, and 21,716 deaths. For the previous year, from July 1st, 1882, to July 1st, 1883, the record showed 9,166 marriages, 24,430 births, and 23,310 deaths. From July 1st, 1881, to July 1st, 1882, the record was 8,837 marriages, 23,108 births, and 25,959 deaths. These represent years in which the returns have been most complete, and are believed to show a reliable decrease in the death-rate of the State.

For these years the total deaths under five years of age were as follows:

1881–2	10,512
1882–3	8,790
1883–4	7,971
Total	27,273

The following is the aggregate of deaths from zymotic diseases for the last three years in the State, each year being stated separately:

1881–2	7,753
1882–3	5,973
1883–4	5,298
Total	19,024

This gives 38.42, or over one-third of the deaths, as under five years of age, and 26.80, or over one-fourth, from this class of diseases. There is some difference of judgment as to one or two of the diseases to be classed as zymotic. The term means ferment, and was first applied to a class of diseases which were believed to depend upon some form of septic ferment developed under special circumstances. In

these, animal or vegetable decay or putrefaction was believed to give rise to special classes of symptoms, although the accurate chemical conditions which determined whether the disease should be one or the other was not known.

Since some form of vegetative life has come to be recognized as an essential factor in most if not all of these diseases, the former term is not so descriptive. They have been since associated under the names of communicable diseases, or preventable diseases, or filth diseases.

In the present state of our knowledge, it is recognized that the fevers spoken of as remittent or intermittent, typhus, typhoid, and relapsing fever and small-pox, scarlet fever, measles, whooping-cough, croup and diphtheria, erysipelas and diarrhea, as found among our infantile population, are dependent upon local conditions, or upon the conveyance of a contagion. Cholera and yellow fever belong to the same category. Consumption is recognized as largely owing to the local conditions of surroundings or to the diatheses of individuals, and is claimed by some to be communicable. However this may be, it is no doubt to a great degree a preventable disease. Many cases of brain and nervous disease, also, might well be classed as preventable. In the statistical tables as printed we give the causes in the more prominent or specified diseases. Also, for the purpose of showing the proportion of the diseases largely preventable, we associate together the first eight diseases named in the table, and add to it erysipelas, which has come to be regarded as a disease dependent on a specific contagion. In the above enumeration, and in our comparative percentage of so-called zymotic diseases as given in the table, all these are included. Also, typhus fever, which is very rare, but which, when occurring, is distinguished by a dot in the typhoid column of the office record. With the caution that all figures for a single year are approximate indications as to the healthfulness of persons in localities, to be corrected by comparisons with larger numbers over a larger number of years, and by incidental facts which modify their significance, we proceed to note in general some of the more prominent indications and facts as to the prevalence of various diseases. The first notable fact is a variation depending largely upon density of population. This is not only noticeable when we study a county like Hunterdon, with a death-rate of 11.12 per thousand, and compare it with Jersey City and Paterson at 25.15 and 28.33 respectively. Even with this we are to remember that Hunterdon county has a city so large as Lambertville,

which increases its death-rate over that of a county population. Also, that here and there a close street in a small village is also a factor in disease. It would be expected that the crowding of persons and of human habitations would increase the ratio of disease, but such is found to be the case to even a greater degree than general facts and principles would lead us to infer. For, with the direct effect there come, also, indirect or collateral evils, which affect the soil, both as to its drainage and its pollution, which affect both air and water-supply, and which lead to the collection of filth in many ways. Yet where this is realized and compensations are made, it is astonishing how possible it is to overcome the disadvantages, and, in fact, turn them into real advantages. Indeed, this has been so efficiently done in some of the larger English cities as to show that collections of population can be run economically for health, just as the division and classification of labor in large factories or industries often makes the loss far less than it would in a more restricted occupation. Speaking, for instance, of the lowered death-rate of London, Mr. R. Rawlinson, C.E., says: "Since 1848 cesspools have been abolished by tens of thousands, so that London at this day stands sewered, drained, and freed from most of its cesspools, and is in this respect the most fully water-closeted and cleanest great city in the world." Where it becomes esseential to classify work and to put it under expert administration, it is often far better done than if every one is left to do that which is right or wrong in his own sight.

But it must be fully and thoroughly realized that a house is an artificial thing, and that rows of houses filled with people are still more so, and that when we come to herd all classes of people in villages, towns and cities, we must recognize that we are placing them in unnatural conditions. Both nature and art must be so utilized and adjusted as to be compensatory, and then associated life becomes healthy as well as convenient. In accord with the general statement, we find that Bergen, Burlington, Cape May, Hunterdon, Morris, Somerset, Sussex and Warren counties have each a death-rate below fifteen deaths to every thousand inhabitants. These eight counties give an excellent showing for the year, although it should also be compared with that of the previous five years.

It has been claimed that the general death-rate of rural counties ought not to be higher than ten for the thousand in New Jersey. For counties with many towns and few cities of over five thousand popu-

lation, seventeen deaths to the thousand has been stated as an average rate. The counties of Cumberland, Gloucester, Monmouth, Ocean and Salem, although quite rural in their population, come in between fifteen and seventeen death-rate for the thousand. Between seventeen and twenty-one we have Atlantic, Camden, Mercer, Middlesex and Union counties. Atlantic county would not fall in this division but for the large and sudden influx of summer population, and even with this has a larger proportionate number of deaths, because of the invalidity of many that are brought there. The other counties show the quick effect of city populations, especially those of the labor classes.

There are left the counties of Essex, Hudson and Passaic, with a death-rate of 22.17, 24.95 and 24.96, respectively. The death-rate of Hudson as a county is even higher than its death-rate as to its cities, because, in addition to great local disadvantages, these townships have thrust upon them many of the evils of the cities. They are made too much the dumping-places for all that is intolerable in the cities. In the case of North Bergen township, it should be included in the city death-rate, since it contains the almshouse, the penitentiary and the asylum of the county, and because of this has the highest township death-rate in the State. . With the addition of cemeteries, odor factories, etc., it is not surprising that the whole county has so high a death-rate.

As we come to note the cities, these, too, differ among themselves as to death-rate, by reason of locality, of density and character of population, of trades and occupations, etc.

The lowest death-rates are those of Salem, 15.43; Plainfield, 16.25, and Rahway, 17.19. A reference to the birth-rates, however, will show that this low death-rate does not fully indicate the relative health of these places since they are defective in birth-rate and child population, and, so, have less of the material most susceptible to disease. Business depression, too, sometimes leads the younger and family classes to move away, while the middle-aged and the old, who have become fixtures, have to stay.

Next to these cities we find Phillipsburg, 18.10; Millville, 18.54; Bridgeton, 18.69; Burlington, 18.93. All these and other localities should be compared with the death-rates of the combined five previous years, as often, for a single year, the variations are from incidental causes.

Next are Bordentown, 19.68; Morristown, 20.77; Elizabeth, 20.93.

Between a death-rate of 21 and 24, other cities take their places in the following order: Trenton, Gloucester City, Orange, Harrison, Hoboken, Bayonne, Camden, Chambersburg, New Brunswick, Passaic and Town of Union.

Above a death-rate of 24 to the 1,000, we find in their order, Newark, Jersey City and Paterson.

We do not include Atlantic City for reasons already given, as, no doubt, but for its summer population its rate would be less by nearly one-half.

In most of our cities it is not yet time for sanitary measures to make themselves felt largely as to the general death-rate, although it should be manifest on some of the more preventable diseases. The cities of Camden, Newark and those of Hudson county, by reason either of Boards of defective powers, or their want of funds, have had no adequate sanitary care. Paterson has only within a year been placed on a basis of sanitary administration. Besides, with the increase of population, as to which our approaching census will inform us, the statement of death-rate for this year is, probably, calculated upon too small a population. It did not seem best to us to apply a table as to approximate population until we had the facts of the semi-decennial census. But, with the facts we have, there is much material for study. Also, it is only by getting the more general facts, and by their study, that we get that analysis which has always been found in the past a valuable guide in studying the health problems of society.

DEATHS UNDER FIVE YEARS IN COMPARISON WITH TOTAL DEATHS.

Of equal, if not greater, significance will be found a study of the comparative deaths under five years of age. These are very properly accepted as showing much as to the vigor of population and influences unfriendly to health. It is to be borne in mind that this column is not the death-rate for each 1,000, but a comparison between the total deaths and the deaths under five years of age. Such an exhibit of the percentage, which these deaths bear to the whole, show how many die at this early age and, also, how many more of such die in close cities and certain populations. It is a very unnatural thing for a child to die. It is only because we come to regard what is common as natural that such a mortality among the young does not at once, in the interests of social life and prosperity, compel a rigid

inquiry into causes. Anything approaching it among domestic animals would pass as a great national calamity.

When we find that over one-third of all deaths, at all ages, are from zymotic diseases or consumption, and that modern hygiene and medical art claim most of these diseases as preventable, we cannot but be led to close attention to causes in order that the material resource which we call population may not be wasted.

When we find that the deaths of children under five years of age in all Hudson county is 41.44 of the entire deaths, and between forty and fifty per cent. in many of the cities, we cannot but look upon young humanity as either the most perishable or the most mismanaged of all live material. As we look for the reason of the loss, it is not far to find.

Dr. George Wilson, in his book on "Healthy Life and Healthy Dwellings," has claimed that "the zymotic death-rate in healthy districts ought not to exceed 4 per 1,000," and Edwin Chadwick, C.E., "that in new localities with healthy dwellings, properly constructed drainage and a pure water-supply, we may reasonably look forward to insuring a death-rate of only 10 per 1,000."

Bad air and wrong feeding are the cause of very many deaths in the early ages. The counties can be profitably compared with each other, as well as the county and city deaths at these ages.

It is wise also to compare the death-rate of some cities with the immediate county in which they are situated. While, for instance, the death-rate of Jersey City, Hoboken, &c., varies but little from that of the county, the death-rate of Camden county, without Camden and Gloucester City, is 15.25; of Passaic county, without Paterson and Passaic, 10.53; of Essex county, without Newark and Orange, 13.63; of Mercer county, without Trenton and Chambersburg, 16.20; of Hudson county, without its cities, 31.90.

If the death-rate of a city is high in proportion to that of the surrounding county, it is all the more significant of manufactured diseases.

The year that we are considering must be regarded as a healthy year for the State. While measles had a wide-spread prevalence in the State, it did not register many deaths. While, as always occurs, some of the various communicable diseases have been epidemic in localities, it cannot be said of any one of them, save measles, that they have been very prevalent. While we have no accurate return of the number of cases of sickness, yet from some inquiry and from general

information we are led to believe that the greater knowledge of methods of isolation and prevention and of the hygienic conditions and surroundings which should be maintained during sickness has caused a decrease in the actual mortality—a smaller percentage of deaths, even where there is not much lessening of the number of cases. Indeed, one of the most hopeful signs in preventive as well as in remedial medicine is that practitioners have come to give to the former more of its relative significance—to include hygiene and prevention as a part of clinical and administrative medicine. We are able to-day to point to health officers and to many of our leading physicians as, in their own experience, in possession of facts which show the practical advantage of control over a large class of diseases by sanitary methods, for which they should receive the highest appreciation by the general public; all the more because their philanthropic and civic or patriotic service has no adequate pecuniary reward.

SPECIAL DISEASES.

In the study of special diseases and their prevalence in the State, physicians are respectfully asked to compare, from year to year, the tables and the synopsis of the diseases as presented in former reports. The tables are combined in the five-year table in the last report, the death-rates and other facts as to which will also be found in this report for purposes of study and comparison. The comments cannot be repeated, but are intended to be made so as, as far as possible, to give an outline of the facts and of the lessons which they convey. It is only by comparisons from year to year that we gain that advantage which in the history of disease is akin to clinical details of individual cases.

Remittent Fever. The average of deaths from this in the last five years, previous to the present year, was 344, showing for this year a lowering of the general average of 144. While there is no soil or telluric disease in which the number of deaths bears so small a proportion to the number who suffer, yet they are an indication of its severity and to no small degree of its prevalence. If there is any one fact established beyond controversy, it is that this disease is dependent upon what may be called artificial interferences with that natural process of decay by which the forces stored in vegetable nature are transferred into other modes of energy. Nature has its own way of con-

ducting the destructive as well as reproductive functions of the vegetable world, and has also many compensatory methods for the errors we make, or that circumstances make as to it. But there is a limit to these compensations. When the equilibrium is destroyed, or when changes and decompositions occur grossly out of the normal methods, the soil, the air, the water become the recipients of organic particles unfriendly to the best vigor of animal life. Those who are compelled to come into such localities, or to partake of the results of such changes, come to have a series of symptoms for which the more specific terms are remittent or intermittent fever. But as there are less declarative symptoms, the term malaria is used in a general way to describe them. While some of these are unmistakable, there are others which are very obscure. This has led to the use of the term malaria in a very loose way by the laity, and even by some physicians. Surely, a general condition of malaise is not to be called malaria unless we are able, technically, to identify the periodic and other concomitants or the type of disturbance, or unless the remedies which seem somewhat specific by their quick response give a kind of crucial test. While there is a difference of susceptibility on the part of individuals, and while there is such a thing as the establishment in some of a toleration of the influence known as acclimatization, we can not be too seriously impressed with the desirability of removing the influence as much as possible. This is done chiefly in three ways: By such drainage as will secure the free movement of air as well as of water through the upper ground; by not suddenly or permanently exposing to heat, ground with organic matter in process of decay without such drainage, tillage and heavy cropping as will dispose of the results by chemical and vital vegetative appropriation instead of diffusing it as irritant material for animal life, and by such use of preventive methods as will protect against the influence.

Of these, the first two are the most essential and radical. What drainage and tillage can do and has done is no longer one of the mysteries of art. If men will neglect this, and if, in addition, they will saturate the soil, impound the water, expose decaying material to moisture and sunshine so as to spread the organic materials through all the inbreathed air, they must not, while quaking with the chill or burning with the fever, or in general ill health because of this bad air called malaria, wonder at the mistake of Providence or the ignorance of doctors. It is only the evil genius of human methods

vigorously applied to the manufacture of disease. It was significantly emphasized a few years since, when a peculiar season and the sudden blighting of vegetation by a July sun precipitated an influence which so fell upon every citizen that not two persons in the community could be found who had not felt the effect, or could accept the challenge to come before the court and testify to their exemption. It led to such changes as greatly mitigated the evil, and, if followed out, will do much to relieve a troublesome stream at Bound Brook.

In the last report we alluded to two facts of more recent impression, viz., that water is more frequently a carrier of this organic or particulate matter into our systems than was formerly supposed, and, next, that heat, as now diffused by furnaces, etc., in houses and in cities, furnishes power of forced and unnatural decomposition to much vegetative matter in winter, and so makes this class of diseases more common in cold weather than formerly.

Typhoid Fever. No doubt is raised as to the relation of this disease to that class of filth which is most liable to accumulate in the household conditions of animal life. It can, perhaps, even more definitely, be called a fecal disease. It would seem that persons of susceptible condition, exposed to certain forms of matter undergoing degrading and unnatural changes, come to receive from it an influence which, in their systems, changes into a specific contagion, and so not only sickens them with a typical fever, but is able, through these secretions, to impart it to others. The only difference of belief is that some claim that no case of this especial type occurs without being transferred from some antecedent case, chiefly if not entirely through the intestinal secretions, while others believe that certain combinations and degradations may take place, such as originated the disease in the individual, or the materials therefor in his surroundings. Those that claim the latter do not deny that the more frequent transmission is by the former. But whichever view is correct, the fact remains of the relation of local and avoidable conditions to this disease. It is preventable, and at present is to be dealt with both with reference to not furnishing, by means of domestic filth, a nest or hatching-place, and so dealing with a patient and all his secretions and surroundings that he shall not be a propagating center. The average of deaths from this disease in the State for the last five years was 564, which was just the number of deaths from it the year previous to the last. This year we had from

it 640 deaths. Of this increase Hudson county had an advance of seventy over the average of five years, and Passaic county of eleven, while some counties are a little less. Essex and Camden show slight advances, and both are too high. In all of the cities of these large counties there cannot be too close attention to the water-supply. Since the close of the last vital year, Camden city shows an increase of typhoid fever.

While only one of the zymotic or filth-fermenting diseases, its index finger is never to be lost sight of by the local sanitarian. As it does not often occur in persons past fifty years of age, we ask of physicians a close statement of symptoms in the "remarks" where, in older age, the fever is plainly of this type. Of the 640 deaths, 431 were in cities of over 5,000. While this shows an excessive ratio in cities, it also shows that it largely prevails in towns, villages and rural localities.

Small-pox. This year, like the last, has shown very few deaths from this disease. It is the leading preventable disease, since, with the facilities of arm-to-arm and of bovine vaccination, there is no good reason why any case should ever occur in the State, unless it be in a person not susceptible to vaccination. Many old physicians will tell you that they have never found such a one. While we have good reason to believe that vaccination is much more common than formerly, it is to be remembered that the vaccination of the past does not protect the annual birth-crop. Parents must feel themselves charged with the duty of protecting their children in the first year of infantile life. Teachers and school trustees should insist upon it that all pupils be vaccinated. Both the State school and public health laws provide for this. Its importance and the facts in evidence are fully presented in former reports and in circulars of this Board.

Scarlet Fever. The deaths from scarlet fever this year have been two hundred and twenty-four less than the average for the last five years previous. It is still the dreaded disease of the household. Such signal instances come to us as to the prevention of its spread by isolation, by care and by the precautions of the attending physician, that we feel the mortality from it should be greatly diminished. In the hands of competent attendants, the first case is more likely to die than the rest, for the reason that it is not apt to be taken in hand so promptly, or to have as good hygienic conditions as the rest. As it is a

disease, so far as at present known, always derived from a previous case, too much precaution cannot be taken as to exposure thereto. We find in our records many cases of adult death therefrom. Because of the relation which the scarf-skin as well as the breath has thereto, it is more diffusable and longer transmissible than most of the contagions. Its transmission by means of milk purchased from families where the disease exists, is plainly proven. Cats or other small animals convey the disease. Physicians need care as to the return of children to schools, nor in case of death is it officious in them to advise as to the conduct of the funeral in the interests of health.

Measles numbered seventy-four deaths above the average of the last five years previous. Of the whole number of deaths (one hundred and eighty-nine), one hundred and fifty-three occurred in the counties of Essex, Hudson and Passaic; one hundred and thirty-six in the cities of Newark (forty-eight), Jersey City (forty-five) and Paterson (forty-three), and one hundred and fifty-two in all in cities. It is a disease, so far as we can judge from our tables, as frequent in the country as in cities, and one which no section fully escapes. But it is noticeable that it is much more fatal in cities than in the country, and chiefly so from the bad air and the complication of pulmonary disease which occur. In too many instances where it does not cause death it initiates an impairment of the breathing organs, and leads to bronchitis, consumption or other forms of lung lesion. The decrease of its occurrence and of mortality therefrom depends largely upon prevention, isolation and the best hygienic conditions.

Whooping-Cough. The same remarks apply measurably to this disease, which, although having a spasmodic element, is essentially a bronchial disease. It numbered in all 116 deaths, or seventy-five less than the average of the previous five years. It, too, has a special city fatality, seventy-two out of the 116 deaths having been in cities of over 5,000 inhabitants. Conditions of atmosphere and of exposure, as well as of foul air and imperfect care, have much to do with its fatality. The physician should early mark out a line of management, even where no continuous attendance is needed. Since we have come to know that the expulsive breath and the sputa, whether fresh or dried, bear close relations to the communication of the disease, it is not so often transmitted as formerly.

Croup and Diphtheria. The cases of death therefrom for the last year were in all 1,027, or 117 less than the five-year average. But even yet the record is much more than that of small-pox, scarlet fever, measles and whooping-cough combined. This is all the more significant, since many of the deaths from scarlet fever are noted as having secondary diphtheritic complications. Even allowing for those who would class the sudden cases of croup as distinct from diphtheria, it leaves a number of deaths from this disease that may well attract our most serious attention. In the fourth report, (1880, pp. 7–13,) we sought to outline the chief evidence as to the character of this disease. While long ago recognized as a sequel in measles, scarlet fever, and some other ailments, it is within about thirty years that it has come to have more distinct consideration. From the fact that, unlike the eruptive diseases, one attack does not serve to prevent another, it continues to be, even more than these, the dread of households. It has, in some respects, a history and a progress quite different from other communicable diseases.

A prominent medical authority has recently sought to emphasize the fact that its milder forms often occur unnoticed, or so mild as not to confine to the house, and that thus it arises from conveyance much oftener than is supposed. There are certainly forms of follicular or diphtheritic sore throat that either convey the disease or put the local mucous membrane in a condition susceptible to its implantation. But multitudes of cases are on record in which there seems to have been no reasonable explanation except that of *de novo* or spontaneous origin by certain co-operations of filth, dampness and heat. There is no disease to which the principles of isolation, of watchfulness, and of prompt treatment, need to be more sedulously applied. It is even probable that antecedent treatment limits or prevents the disease. Those physicians who are watchful of throat conditions, and who deal most promptly with the first symptoms, are the most successful after the first case which has often made too much progress before its gravity is suspected. It is rarely that there is not some local change in the appearance of the throat before there are any constitutional symptoms. Always where diphtheria is prevailing an examination of the throat is desirable, since the first symptoms are without pain or other marked manifestation. It is believed by most that the early use of remedies, both topically and internally, are very certain to abort the disease in its early stages. The confidence that our ablest practitioners have in

grappling with the disease, if only they can regulate homes and surroundings and see patients at the earliest moment, is the best evidence that the duration of its death-rate is within the reach of preventive and restorative sanitation.

Diarrheal Diseases. The deaths by diarrheal disease, as stated in the statistical column, include only deaths between one month and twenty years of age. Diarrheas of the first month are so often incidental that they should not enter the general classification, while those of older life are properly ranged with digestive and intestinal diseases. A large proportion of the deaths from diarrhea are under five years of age. The average of the five previous years was 2,353, while the number of this year was 2,462. Comparison between the rural and the city counties, and between these counties and their cities, are the strongest evidence of how far such deaths are the results of artificial causes. One thousand seven hundred and twelve of the deaths were in cities of over five thousand, although the population is nearly equally divided between these and the portion of the State not thus included. There is a similar excess of death-rate of children under one month in such cities. The excesses are most marked in Jersey City, Newark and Paterson. Ill care, improper food, bad air and bad water have this special way of telling their tale. So evident has this become, even to the eye of a general charity, that fresh air funds have been provided by a spontaneous gratuity. The death-rate is thus lowered by the better food and better air of the open country. Even the changes of a day are often found to record marked improvement.

The worry of mothers, impure milk, and with older children the promiscuous use of table food, has much to do with this increase. But the general conditions of city life, and the fact that the working and more dependent populations are not able to leave cities permanently for the summer months, makes this great mortality. If the death-rates from infantile diarrhea were reckoned on the basis of the actual summer population of our cities, it would be much larger. If the methods adopted by New York City, Boston and a few other cities in the care of the infant population for the summer months is correct, that of Jersey City, Newark and Paterson are very defective. It deserves to be noted that the Health Board and Health Inspector of Paterson so far recognized this that they have already devised methods of prevention. We earnestly urge on all local city Health Boards to

study their statistics in reference to ward and neighborhood conditions, and to seek that knowledge of tenement and other house conditions which is essential to the proper care of civic life.

Dysentery. This is not made a separate column in our printed tables, but is marked by a dot, so as to distinguish it on the office sheets. It has prevailed more this year than during any previous year since the facts have been systematically obtained. One hundred and eighty-eight cases in all are reported. It is especially noticed in Burlington, Essex, Gloucester, Hudson, Passaic and Warren counties. In the vicinity of Williamstown it was so prevalent as to lead to active inquiries and arrangements for prevention by the Board of Health. There were, however, few deaths in that county. Before this, the vicinity of Mount Holly has had more than its share of the disease. It is believed to be traceable to polluted wells, much more than is generally appreciated. Special conditions of heat and moisture and malarial influences have much to do with its prevalence. Physicians and others should carefully examine as to water-supply and other sanitary conditions where cases occur. Also as to its possible communicability to others through the discharges. The disinfection of the discharges and their disposal in ground distant from wells, rather than in the common privy, is always desirable when possible.

Erysipelas does not record a large death-rate. But because of its frequent occurrence, of its occasional malignant character and its relation to puerperal fever, it deserves the close attention of clinicians and vital statisticians. The deaths from it for the five years previous to this, were within eighteen of those from measles. It is no longer in doubt that it has a specific contagion, under some circumstances communicable, and so is to be dealt with as is this class of ailments. J. Burden Sanderson, in his Pathology of the Infective Processes, says of it that it "originated from a focus of infection." A contagion has been inserted or otherwise came into existence in the tissue of the affected part. The effect seems to be not that of general septic change, but dependent upon micrococci. Whether the disease is, therefore, an implanted one, or whether it has come about from some degraded condition of the blood or tissue, may not always be certain. But the possibility of others contracting it, of its conveyable character, of its becoming a malignant epidemic, and of its affect-

ing those who are in a puerperal or traumatic condition of susceptibility, is ever to be borne in mind.

Puerperal losses differ but little from the average of former years. These are so serious to families and so often leave children in dependent orphanage, that too much protection cannot be given to mothers from the avoidable perils of maternity. That erysipelas, scarlet fever and suppurating wounds are sometimes a danger at such periods, is admitted. That there is also peril from unskilled attendance, cannot be denied. It is doubtful whether those who have no diplomas in midwifery should be allowed to offer their services in this capacity. While every facility of choice, consistent with safety should be afforded, most governments, in their economy of human life, have thought proper to require some test of fitness. Others provide retreats for those who need attendance and have not property or home conveniences.

Consumption, which is so dependent in very many cases upon avoidable causes, for the last three years has the following statistics of deaths :

	Males.	Females.	Total.
1881–82	1,696	1,779	3,475
1882–83	1,527	1,594	3,121
1883–84	1,557	1,658	3,215
Total			9,811

Thus it causes about one-seventh of the whole number of deaths. But as few die of consumption under five years of age, and as its chief havoc is with grown life and during the productive and industrial period of life, it is more significant than the mere numbers would indicate. About twenty-three per cent. of all adult deaths are from this disease. The deaths therefrom this year have been a little beyond the average for the last five years. It will be noted that the number of deaths of females from it is uniformly a little beyond those of males, the excess for three years being 251.

Consumption stands for a large amount of preventable disease. While it comes by inheritance, it comes still oftener as a direct result of occupation, of unventilated houses, school-houses and work-shops, and of unwholesome food and of imperfect care in many ways. It also has much to do with dampness of soil and of houses, with sudden changes of temperature and with a sedentary life. Former reports

furnish some important details as to this disease. While the number of deaths recorded therefrom in the five years previous in the State is 15,077, the number in cities over 5,000 is 9,072. For the last year, of the whole number, 3,215, the number in cities of over 5,000 was 1,996. It is on the increase as a disease of city life, and is a warning index of the deterioration of population. It is also to be borne in mind that pneumonia and chronic bronchitis cause very many deaths and are also largely attributable to local conditions.

Acute Lung Diseases. The record of these for five years previous to this year was 11,864, of which 7,130 were in cities of over 5,000 inhabitants. For the last year the deaths therefrom were 2,174, of which 1,416 were in the cities. Pneumonia is so prevalent and fatal in some winters or parts of seasons as to have led some to regard it as at times having some specific cause. It certainly shows much more tendency at some times than at others to assume a typhoid character. The agency of foul air in causing pneumonia is no longer doubted. When an audience rushes out from an ill-ventilated and crowded assembly room into the open air, it is not simply that there is a sudden change of temperature. The circulatory system of the lungs and the vaso-motor nerve supply of its tens of thousands of minute vessels is seriously affected and depressed by such infliction. The healthy and unembarrassed lung rapidly adjusts itself to changes of temperature, if not too intense. But if by bad air you paralyze the power of adjustment, the depression is increased, or if there is reaction it is in the direction of congestion. We would therefore emphasize the fact that acute lung diseases are not less dependent upon the depressing influences of befouled air than upon thermometrical and barometrical changes.

Brain and Nervous Diseases of Children. In the last five years previous, 8,609 children, or persons under twenty years of age, died of this class of diseases, of which 5,905 were deaths in cities of over 5,000 inhabitants. For the last year the number was 1,598, of which 1,110 were in the larger cities. While it is impossible to state how many of these are preventable, we do know that wrong food, the neglect of first symptoms, and the pressure of school life have much to do with the multiplication of such diseases. A recent circular of this Board, (XLVII.,) cautions parents as to early attention to first

symptoms. The number of deaths does not fully measure the extent, for many brain and nervous ailments in after life have their origin in neglect or mistakes during the growing age.

Diseases of Heart and Circulation. Five thousand five hundred and seventy-five was the number of deaths from this class for the five years previous to the last, of which 2,906 were in cities. For the last year there were 1,324 deaths from this cause in all, of which 746 were in cities. It will be noticed that the excess in cities over the country is not so large in proportion as from several other diseases. Rheumatism is a very potent factor in the causation of heart disease. It is as common in the country as in the cities, by reason of greater exposure. Many farmers have to trace heart disease to attacks of rheumatism which have gradually impaired the valves of the heart. In most cases of death returned as acute rheumatism, the immediate cause of death has been pericarditis or other interference with the heart and circulation. Hereafter, in the printed table, acute rheumatism will appear in the heart column, and be distinguished as usual on the office tables. The deaths from it for the five previous years were 318, of which 154 were in cities. This year it numbered 62 deaths, of which 28 were in cities.

Urinary Diseases. Distinction between urinary and kidney diseases are marked in our office records. The whole number of deaths for the five years previous was 3,199, of which 1,804 were in cities; for the last year 892, of which 558 were in cities. This marks some increase. There is some reason to believe that the freer use of condiments and of burning catsup, as well as alcohol, have a serious effect on the complicated circulation of the kidney. This is all the more serious since many cases of adult brain disease are secondary and dependent upon some form of renal inflammation or failure in function.

Adult Brain and Spinal Diseases. These for the five previous years have numbered 7,247 deaths, of which 3,447 were in cities. The last year numbers 1,664 deaths from this cause, of which 806 were in the larger cities. Paralysis and apoplexy are often diseases of very robust as well as of overtaxed life. The causes which give rise to this class of diseases are various. The energy of business, the active rush, the hurried methods of the age greatly tend to overcome deliberation and

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add to the wear and tear of human life. Such diseases increase out of their due proportion, and many fall victims to long paralysis or to death sooner than would occur in the quiet walks of life. Caution and precaution, due self-control and skilled advice would postpone for many a too early breaking down of nerve and mental forces.

Digestive and Intestinal Disease. When it is remembered that this column includes no one under twenty years of age in our enumeration, the deaths of 4,789 in five years from these causes (2,455 being in cities), or of 1,075 the last year (607 being in cities), shows that large numbers succumb to errors in diet, such as are not sudden in their results. Very many formed and endowed for a life of seventy years, have their days shortened by errors which finally wear out the powers of digestion. Rules as to good food, exercise and the management and self-control of the appetite deserve to be carefully studied by all who would ward off the later failures of life-power. With such the power to secure and use up the right food after the middle period of life is the determining consideration as to whether the life can be prolonged to old age.

Cancer. For five years previous our returns record 2,115 deaths, of which 1,127 were in cities. For the past year there were 484 deaths, of which 288 were in the larger cities. It is a disease which as to its causes and pathology is having close study, but which as yet fails to be reached by preventive methods.

A review of these causes of death furnishes us with many indications as to preventable disease, and the proper care of population. When it is remembered that careful statistics based on life insurance and other facts as to disease, have shown that for every death there are on an average two persons sick the year round, or as Lyon Playfair calculates it, there are for every unnecessary death twenty-eight cases of unnecessary sickness, we cannot but come to some realization of what a tax on happiness, on industrial energy, and on all life, avoidable deaths and avoidable sickness are, and redouble our energies to restrain the wastes of avoidable disease, to remove its burdens, and so add to human health and happiness.

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OF THE

BOARD OF HEALTH

OF THE

STATE OF NEW JERSEY,

1885,

And Report of the Bureau of Vital Statistics.

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1885.

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REPORT OF THE SECRETARY OF THE BOARD.

To His Excellency Leon Abbett,

GOVERNOR—I have the honor, in behalf of the State Board of Health of New Jersey, to present to you its ninth report. In the initial work of this Board, there was some occasion to feel that the public mind was not sufficiently interested in the object for which it had been created, and did not fully realize the evils resulting from preventable diseases.

As it has progressed, it has been able, from year to year, to recognize a growing appreciation for all that relates to the health of the people. The work no longer lacks a constituency. Indeed, our greater anxiety is to be equal to the responsibilities which it involves, and to be able to respond to the intelligent inquiry and aid which is so frequently manifest. It is now seldom necessary to argue the necessity of a care for the public health. The demand of the present is to know what are the real teachings of sanitary science, what are the appliances of sanitary art, and what modes of administration are the most practical and most successful. We are out from the long range of general principles into the close contact with actual applications. Just what to do and how to do it, are the close and urgent questions which do not admit of glittering generalities.

It is pleasing to know that such demands are being met. Any practitioner of the sanitary art, whether it be the architect, the engineer, the physician, or the sanitary counselor, is aware that there is far more of real and exact knowledge than has yet been applied.

If called upon to-day to execute drainage for health, to build houses, or form streets, to procure good water-supply, or provide for disposal of all decayable matter, there are those to be found who can construct and carry on a sanitary city at an expense that would be as economical of money as it would be of health and of life. Various sciences and arts have been laid under tribute and have transferred to the science of hygiene the items of knowledge that make up its aggre-

gated value. The sanitarian has so applied these to the vital problems of existence as to have organized a special department, whose aim and result is the diminution of human ailments and the prolongation of life. Its field has widened and is still widening with all the breadth of an applied science. It is no longer the question of how to remove filth or manage an epidemic. It enters upon definite plans to prevent such accumulations and to deal with disease before it attains the proportions of an epidemic.

It inquires into the modes of maintaining personal health for the population at large. It concerns itself as to the care of children, in the home and the school, and seeks to interrupt the many physical evils to which the young and growing populations have long been subjected. It enters the factory and workshop and claims that labor should be relieved of all the avoidable burdens of unhealthy conditions, and that the young shall not sacrifice bodily vigor and education to the demands either of the parent or the employer.

It examines into the quantity and quality of foods, and is able to designate the most valuable sources and combinations, and what cookery can do to aid in appetite and nutrition. It inquires into disease, in order that it may know where and how the departure from health began, and how to guard others from the repetition of the same error, as well as to apply the laws of hygiene to the recovery of those already affected. It keeps account with life and health, and with its statistics is able to show where the debilitating and destructive forces of misguided nature are disturbing or destroying mankind.

It proves that the greatest material resource of a State is its population; that to care for it is to husband these resources and turn them into channels of successful industry.

Hence, the statesman and the political economist are beginning to look to the health of the people as the central idea of happiness, prosperity and wealth.

This advance in the recognition of the meaning and intent of hygiene has led to some corresponding changes in the work of the Board. While it is still necessary, to some degree and in accord with the original law, "to gather information for diffusion among the people," it is now far more important to educate individuals in the technical work of oversight, inspection and execution, and to perfect the details of sanitary administration. The past year has been especially prosperous because additional legislation, and the decisions

of the highest court, have empowered local Boards, so as to make them more available and efficient, and because general impressions and promiscuous opinions have, to a larger degree than formerly, given place to accurate investigations and detailed reports.

Thus we have on file to-day a graphic outline of nearly every school-house in New Jersey, with answers to all those questions which most concern the teachers and pupils who, for a part of the time, inhabit it.

The same is true as to parts of some of our cities, in which a plan of house-to-house sanitary inspection and record has been adopted. The watchfulness which prevents evils and which provides an officer who counsels and advises as to sanitary matters is much more valuable than the old plan which always waited for a nuisance to occur and then created prolonged disturbance in its removal. That is always a great advance, when any community passes from the stage of complaint over nuisances to that in which it is definitely and efficiently organized for their prevention. There will not soon be the time when great evils can not be found. But he is a superficial observer who has not noted some localities, and some persons in almost every locality, who have passed the stage of doubtful disputation, and who feel sure that many an evil can be prevented, that better health can be maintained and more lives lengthened. Even the commotions and agitations which sometimes occur over great public improvements, and their temporary delay, mark progress. The fact that most of our cities are not willing to rest under the odium of neglect shows that the question is one which involves the growth no less than the health of a city. Townships, too, have their losses from defective drainage, or from villages in which, too often, the condition of some street is no better than that of a crowded city.

No doubt the fear of cholera has had some influence in favor of the greater activity of local Boards. But there are other evidences that there is a growing conviction of the feasibility of health administration. We have now no reason to doubt that the future will show a continuous progress in the State, in all that relates to health and care. While there will be local delays or failures, there will not be any weakening of conviction as to the need of skilled oversight of the public health, and reasonable expenditure for its preservation.

The report of Vital Statistics shows the following record for the year ending July 1st, 1885:

Marriages, 8,989; births, 24,077; deaths, 23,807.

DISPOSAL OF SEWAGE.

The proper disposal to be made of the cast-off organic materials of persons and households must ever continue to be an inquiry having the most essential relations to personal and to public health. If it were stated as an axiom that all decayable or putrescible material should be disposed of so that it cannot, in any way, get into our food or our drinking-water, the principle would not be disputed; yet, in actual life, methods are constantly adopted which hazard the purity, both of the food and of the water-supply.

If we go still further, and say that these materials should be so disposed of as not to infiltrate the air beyond its power of rapid neutralization or removal, this, too, would be admitted; yet, in fact, too often the air is so laden with noxious matters as to be polluted to a degree not consistent with general health. Effort must constantly be made, both by structural arrangements and administrative care, to so dispose of all decayable matter as that it shall not be a menace to the public health. We claim that this is possible to a degree not fully realized, and that, even in the artificial conditions of crowded city life, it is attainable, and has sometimes been attained. Such a result can only be secured where the needs are fully recognized and provision made therefor. What now needs most to be impressed upon the population, and epecially upon organized authorities, is, that the thing is necessary to be done, and that the methods for doing are known. Each year witnesses improvements in the details of method and accuracy in the construction and administration of public works. While there are still various discussions as to dry methods, utilization and water-carriage, one who notes what is actually done will find that water-carriage methods are adopted in all cities of a present or prospective population of over 30,000 inhabitants, and that some form of it is practically used in many smaller towns. This results, not from any fashion, but because sanitary engineers and authorities are so agreed that fecal material and the fouled water of households should be carried away from dwellings while in a fresh state, and that the easiest and cheapest mode of carriage is through pipes, and by water. The chief questions are as to which is the most effective and economical method of disposal of the sewage-water.

Four methods are prominent, any one of which can be made effective and the choice of which depends, often, upon locality. Where

there are large and rapid streams of water, the cheapest plan is to pass the sewage directly into the channel of a flowing stream. We have, in previous reports, shown how remarkable and how rapid are the changes which fresh sewage will undergo when subjected to the forces of air, water, sun-light, the agitation of streams, and when it can be appropriated by the lower orders of life on which fish feed, and by growing vegetation in the rivers and on the borders. Where, as in some factories, the sewage is especially fouled, well-devised methods are now in operation by which some of the organic material can be precipitated and the effluent water be passed into the streams without discoloration or odor. While there is always very much to be said against the pollution of streams which, in their courses, are used as water-supplies for potable water, we are not to assume that fresh sewage passed into any stream affects the water ten, twenty or thirty miles below. The testimony of chemistry and of the microscope is, that nature rapidly forms new and harmless combinations; that low forms of animal and vegetable life are soon supplanted, and that thus there is a constant tendency toward what may be called natural correction, where such material is not too enormous in its proportional quantity, and where it has constant movement amid forces capable of transforming and disposing of it.

The second method we notice is that of "wide surface irrigation," which, for its greatest success, should be combined with "intermittent downward filtration." "Wide surface irrigation" means that fresh sewage is distributed over land in order to be appropriated by the land and by growing crops. For it is found that land which is not wet and not too compact, by the mechanical division which it gives to the sewage and by the air in the ground, so alters the sewage as not only to deodorize and neutralize it, but also as to enable it to be appropriated by growing grass or other croppage. The question of how much sewage a given plot will dispose of, depends so much upon the kind of soil, its lowness of water level and its tillage, that all these must be considered, and in most cases the land needs underdraining. A single acre has been made capable of continuously disposing of the sewage of 1,000 persons. To add to its capacity, it has been found best not to scatter the liquid sewage over the whole ground each day, but to alternate different plots of it, so that thus the sewage might filter through the soil and thus have alternate supplies of air and of sewer fluid in the numberless spaces between the particles of

earth. This is known as "intermittent" downward filtration. It is the union of those two ideas of wide surface irrigation and intermittent downward filtration that, together with tillage, makes up the second method of disposal. The chief objection made to it is the cost of methods of distribution of the sewage and the unsightliness and something of odor in the work of thus distributing it. Hence its adaptability depends much on choice of locality, etc.

SMALL PIPE AND FLUSH TANK SYSTEM.

A third method of sewage disposal depends upon the same ideas of wide distribution of sewage and of intermittent downward filtration, but instead of spreading it on the surface of the ground, conducts it into automatic flush tanks or cisterns, from which branch out in all directions series of land tile or pipes from 10 to 18 inches beneath the surface. These automatic tanks are made of size proportionate to the amount of sewage, so as to empty themselves of the fresh sewage about each day. If open tanks are used where some of the cruder matter settles and some floats so as to be removed, it is possible by chemicals, as alum, potash, etc., to cut the greases and so relieve the sewage from a part of it which is offensive and which sometimes stops up small pipes. The relation of these tanks to the underground pipes is so arranged that some will be used at one time and some at another. The flush or rush of the stream of sewage through these pipes prevents the deposit which would take place from a small tardy flow; and the air which fills the pipes when no sewage is flowing helps to dispose of the more solid contents of the sewage, which is made less solid by the temporary maceration in the flush tank. The sewage-water and the broken-down organic material of the sewage escape through the loose joints of the tile. Where the construction is correct and the land adapted, one is surprised to find how thoroughly the sewage will thus be disposed of in small pipes and how well the land is enriched thereby. Where there is much greasy or soapy matter going into the sewage it is often best to have a grease trap before the sewage reaches the flush tank.

This might very properly be called the wide *sub-soil* irrigation and intermittent filtration system, as distinct from, but allied to, the broad *surface* irrigation system already noticed. In this, as well as in the former system, it is sometimes advisable to first strain the liquid sewage, by such grating as will retain sticks or gross material.

A fourth system is that in which sewage is subjected to some mode of chemical precipitation before any attempt is made to dispose of its organic matter or of the water which is its vehicle. In this the idea is to cleanse the sewage so that nearly or quite all of the organic particles or putrescible matter is separated from it and the water may be allowed as a comparatively pure effluent to flow away over land or into a stream. The arguments for this are that thus the water is made so pure as to be harmless and that the sludge or organic matter left behind can be utilized as a fertilizer. The most usual precipitants used are milk of lime, alum and sulphate of iron (copperas).

This method has been brought into greater prominence of late, because, by means of filter presses, it is possible quickly to reduce a part of the sludge to a dry state and to make of it a portable manure. The remaining liquid is generally allowed to flow back into the general sewage. Sometimes the method of wide irrigation and intermittent filtration is combined with this to the extent that the effluent from the precipitating tanks is allowed to flow over drained and tilled land before going into any stream; and when so managed is, by reason of its reduced quantity and greater purity, much easier to manage than the entire bulk of liquid sewage. This system is now in operation successfully in some English towns, as Coventry, Layton and Salisbury, with various modifications at other places. It also has been very strongly recommended by a Commission on the Pollution of the Thames. Salisbury, the last finished, is thus described:

"The Sewage Disposal Works at Salisbury, England, are now in operation. The scheme is one of chemical precipitation, and includes two sets of four tanks each, seven of which can be used at a time. From the main sewer the sewage passes through a strainer, and under the machinery building, where it receives the milk of lime by which it is precipitated, and then into the tanks. The effluent flows into a small stream, and thence into the river Avon, the condition of which is already greatly improved. When emptying a tank, the top water is pumped on to a plantation of osiers; the sludge is then drawn by vacuum into an iron receiver, and thence driven by compressed air into two filter presses. The sludge, which is pressed into one-fifth of its bulk, amounts to between two and three tons daily, in a nearly dry state, suitable for being carted away, and is being sold at 4*s.* per ton. The cost of the works was about £8,000."

We are constantly reminded by those who, though intelligent in other matters, may not have fully studied all methods of sewage dis-

posal, that there seems to be no successful way of handling sewage. Such is not the case; methods are now as well understood as are other methods in industrial art. The trouble is that most methods are expensive and, that being so, corporations, in order to save money, so cheapen works, and so do things by half, in administration, as to render them incomplete successes. There has been real advance, not only in perfecting, but in cheapening methods. The best investment that many of our cities could make, would be in the construction of more perfect methods of water-supply and sewage disposal.

In this country a good specimen of the wide irrigation system can be found at the Worcester Asylum, Worcester, Massachusetts, and of the flush tank and small pipe system at Memphis, at Bryn Mawr, Pennsylvania, at Princeton Seminary and Lawrenceville Academy, Mercer county, New Jersey, &c. We have no good illustration of a precipitating and compressive system, which we believe will hereafter come to be more extensively adopted. Mr. Grey, civil engineer, of Providence, Rhode Island, after a most careful research into European methods, has advised this for Providence. The Secretary of this Board has made a careful and detailed examination into the various English and European methods and believes this to be one of the most efficient. It is a utilization of sewage, and while it cannot be claimed that it can be conducted at a profit, the sale of refuse reduces the expense. For dealing with fecal sewage, as contained in outhouses, where the towns are not large enough for precipitating and distributing works, the following method of disposal has had such indorsement as to be worthy of trial, although it has not yet been tested so far as to enable us to speak with great confidence:

"To a vault containing forty barrels of fecal matter, add one barrel of common salt; in twenty-four hours add fifteen bushels of unslacked lime; chlorinated lime will then be formed. After eight days it is entirely dissolved and disinfected. Then add seventy-five pounds of sal soda. In ten days the sewage will be solidified and ready to form bricks, which, after drying thirty days, can be used as fuel in burning lime, etc., and are of twice the value of anthracite coal." (*See* Sanitary Record, March 16th, 1885.)

In addition to these four methods, the *aeration* of water, whether it be that of reservoirs for drinking use or of sewage-water, in order to purify it before its passage into soil or into rivers, deserves notice. In 1881, R. Angus Smith, in the report to the Local Government Board

under the River Pollution Act of 1876, speaking of aeration of water, says: "This subject has long interested chemists, and aeration has formed one of the plans of engineers from a long date back." He then refers to his paper on "The Mud of the Clyde," (Glasgow Philos. Soc., 1880,) in which its value was presented. Article VII. of the "Mechanical Aeration of Sewage" is also valuable. In his report of 1883, he follows up the subject both by statement and account of experiments. "When air is blown into sewage-water its properties and its composition are rapidly modified; *the water, saturated with air, is no longer liable to putrefaction.*" We are not aware that this fact received valuable application in this country until Prof. A. R. Leeds, of this Board, applied it most practically and successfully to the purification of the water in the Hoboken reservoir. Similar success has attended its application by him to the waters of the Schuylkill and to the refuse liquids of some manufacturing establishments. We believe that it is yet to be made very largely available as one of the methods of improving potable waters and for the purification of sewage.

WATER-SUPPLY.

The purity of water-supply continues, as heretofore, to be a most important consideration to all who would guard the interests of public health. There is cumulative increase of evidence that it very frequently is the conveyancer of materials into the system which are the cause of disease. It does this either by the absorption or intermingling with it of befouled air or deleterious gases, by holding in suspension minute organic decaying or decayable particles, or the actual germs of disease, by minute animalculæ or by mineral substances in solution. Because water is such a constant necessity, and because it is the purveyor and dispenser through the system, and so the medium of exchange, it has been more frequently recognized as a carrier of disease than the air itself. The attention of chemists, of biologists and of practical physicians and sanitarians is now so fully directed to this subject that we are able to claim that there is much greater attention to the securement of pure water than formerly. But still there are many errors, and there is need of constant vigilance. Too often sources of water-supply are decided upon without that accurate examination by geologists, sanitary engineers and other experts, which is always essential in a matter of such importance, and

often of such expense. We have had occasion to examine the water-supply of a city, which at once proved both inadequate and impure, although the Sanitary Committee of Council had given their unanimous opinion that it would answer. In examining a claimed source of pollution of the water-supply of one of our cities, we actually found the water purer after the chemical material had passed into it than was the original stream. It had been accepted as a water-supply without due examination had. We were recently shown the water-supply which a Board of Freeholders had introduced at considerable expense into an important institution, because they had long known the pond and thought it would do. The first extra demand in a dry summer revealed the blunder made. These mistakes are generally made by responsible men, well-informed in their own line of work, but who are led to judge and decide upon this matter without the requisite knowledge, and with only the advice of some local surveyor. No town or city should introduce a water-supply without the most accurate written report from some one responsible for his opinion. Rain-fall, water-sheds and base of supply are no longer problematical, and can be determined with certainty. Where choice has been made, there is need of constant vigilance. The stream or source should be protected from pollution by frequent examination, or patrol, or chemistry should assure us that the apparent pollution is neutralized and overcome by reason of distance from the intake. Even where the source continues pure, it is to be remembered that reservoirs and stand pipes and distribution pipes need to be fully mapped and frequently examined, as it is well known that water sometimes undergoes serious change in these, and that the pressure of impounded waters, want of air in pipes, dead-ends and the growth of algæ and other causes seriously deteriorate water-supply. We cannot conceive that any water company is doing its duty to its patrons, unless there is this kind of expert surveillance. Generally it is unwise for cities to place themselves in the hands of private water companies, as by their combination and capital they too often become insensible to complaint, or to the prevention of it by such oversight, and because municipalities, by reason of contracts, or the influence of the individuals concerned, are unable to secure what public health demands. In cities it is important to know just how many depend on the public water-supply. Even where this is the only good and excellent water-supply, and is boasted of by the citizens, it is often found that the majority of the people

depend on wells. The recent clamor in Paterson over the stoppage of some polluted wells is an illustration of the pertinacity and innocence with which respectable people will cling to that which custom has sanctioned, and to the use of which their own lives have not succumbed. Dr. E. J. Marsh, President of the Board of Health, made excellent answer in his annual report. He spoke thus:

"In the early autumn months typhoid fever began to prevail to a greater extent than usual, and partly on this account, and partly with a view to prepare the city for the expected arrival of cholera, the attention of the Board was directed to the condition of the drinking water of the city, especially of the wells, which are always open to suspicion. A systematic examination and careful analysis of their waters was made by the Health Inspector, who found the water in the majority of cases to give evidences of gross pollution of animal origin. A few samples of these waters were also sent to Prof. H. B. Cornwall, of Princeton, for analysis, whose report in every respect corroborated that of our Inspector. As a result of these examinations fifty wells were ordered to be closed. In thirty-eight other wells the water was either pure or too slightly affected to be pronounced dangerous.

"As this action of our Board seems to have met with the disapproval of certain members of the Board of Aldermen, a few words of explanation may not be out of place.

"It is a common belief that when a well is dug pure spring-water oozing from the ground is obtained; that is true in the case of artesian wells, but, although possible, is rarely the case in the ordinary surface wells, and under this name are embraced all wells not more than fifty feet deep. The water obtained from these wells is merely the water which has fallen on the surface of the ground in rains, and has percolated the soil and becomes collected in this excavation. It is called ground-water. Even granting that some of the water may be spring-water, some of it must be the result of drainage, and the amount of this will depend upon the rainfall and the character of the soil. A moment's reflection will show that wells must act as drains to the surrounding soil. Just as a wet field may be dried by digging one or more trenches, into which the water of the soil may drain and be carried away, so when a deep trench or well is dug the water from the surrounding soil will necessarily tend to drain into it. This is not only a matter of reasoning, but a matter of experience. The following case is reported: 'In consequence of the escape of the contents of a barrel of petroleum or benzine, which had been buried in an orchard, a circuit of wells 60 feet below and 250 or 300 yards distant became so affected that the occupiers of fifteen houses, containing 82 inhabitants, were for ten days unable to use the water for drinking or cooking.' When wells are first dug in rural districts, the water is pure,

and may remain so for a long time. Fortunately the soil possesses some power of purification, and although the water may receive polluting matter on the surface of the ground, some of this matter is detained mechanically by filtration, and other portions may be decomposed and taken up by growing plants and trees. But this power of the soil is limited. When the sources of pollution are constant and numerous, as in cities, from privies, cesspools, slop-water, offal and the manure of domestic animals, and sometimes from leaky and imperfect sewers and drains, the soil becomes 'filth sodden,' and the filth is carried deeper and deeper, until finally it appears in our drinking-water. Sanitary literature is full of instances of the outbreaks of epidemics of diarrhœas, typhoid fever and cholera, which have been traced to the drinking of well-water thus polluted; and even though the city may go through one or many years without such epidemics, it is not a pleasant thought for the inhabitants to indulge in that they are drinking the drainage of their privies and cesspools, and yet they must realize the idea that their wells are and must be drains for the surrounding ground with all its contents that are capable of solution in water.

"Science cannot tell us that a given water is charged with the poison of a definite disease, but it can tell us that it has received the products of decaying matter from animal sources, and experience has shown, again and again, that such water is dangerous to health. It may therefore be laid down as a rule that in cities the water of all shallow wells is suspicious. The majority of them already contain matters dangerous to health, and the rest may become so at any time. In fact, wells cannot be tolerated in cities when any other water can be procured, and it is the reading of all history that wells have gone as the city has increased in size, or the citizens have paid the penalty by sickness and death.

"The sanitary authorities in other cities are attempting to do away with wells, as far as is possible. A recent report from Brooklyn states that during the past two or three years 296 public pumps were examined; of these 230 were ascertained to have water unfit for human consumption by reason of the entrance into the wells of filth of various kinds from the surrounding soil, or from the street, and these wells have been closed by the Common Council of that city. Mr. Seth Low, the distinguished Mayor of that city, in a message recommending the filling up of such wells instead of attempting to clean them, said: 'I do not understand why it should be esteemed a kindness to the people of any locality to perpetuate the use of bad and unwholesome water, neither do I think it wise to oppose to the results of chemical analysis the popular impression that wells do little harm.'

"In some few instances there may have been some hardships in enforcing the orders of this Board, but as guardians of the public health, it can have no more hesitation in preventing the consumption

of dangerous water than in prohibiting the sale of tainted meat, decaying vegetables, or poisonous candy.

"This Board cannot recommend to you the cleansing of these wells in the hope and expectation that the water would thus be rendered fit for use. In a few cases of accidental temporary contamination such might be the case, but as a rule the contamination will be renewed in a very short time. The only effectual method is to permanently fill in and close all those wells whenever a supply of river-water can be obtained. If it is advisable that the city should supply water, let it be done by hydrants and not by pumps."

It was a pointed comment on the action of this Board of Health, that in August, several months after there had been some conflict with the Common Council as to a favorite well, it was accidentally discovered, in examining a sewer near by, that it had an open connection with a drain pipe, and that within fifty feet of this well it was pouring its contents into the water-supply.

Where wells or cisterns are used there is need for the greatest care that they be properly constructed and kept from all contamination. Some directions as to this were given in the last report. If a well which has been good, suddenly becomes bad, it is not generally by any freak of nature. Something has fallen into it, or the soil about it, which has been in process of pollution, has finally reached a point of saturation beyond the reach of the conservative and protective adjustment which air and soil and filtration are always working at. Perchance some cesspool or vault has found leakage into the well. The wood of the pump or of the curb has become decayed or saturated with filth. We have known cases where a wooden curb or bottom, put in at the time of building a well to keep out quicksand, has served its purpose very many years. But after a time the wood decays, or by some accident the water is fouled and the wood absorbs the foulness. Wells unused for a time often become thus permanently unfit for use, so that no future outside cleansing serves to restore them. We often find, especially on the shore, wells and privies built near to each other, on the ground that the well is a driven one and that the privy is cemented tightly like a cistern. If the well is deep down, and if the vault is and is kept constantly water-tight, this would be safe. But facts too often show a crack in the cement or an injury of it by the contents, while the tube of the well serves on its outside as a conduit to lead foul liquids below. As a system it is never safe.

Where surface wells have been contaminated by cesspools, as in an

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important city of this State, it has become common to substitute driven wells. This, no doubt, is an improvement, but is only safe when they go through a deep clay stratum. We have known, for economy, the boring to be begun at the bottom of the polluted well, after the water has been pumped out. It is an unsafe economy, for too often the new well eventually becomes affected.

No one can study the geology of this State without being struck with its wonderful facility of water-shed for the supply of our largest populations, and without being equally struck with our slowness and want of foresight in not sooner availing ourselves of these sources of supply. Some of our cities have excellent water-supplies, while others are still defective. But it is encouraging to know that now no new works are projected without great care. The success of driven wells on the New Jersey coast is fully assured. While there will be occasional failures, yet it can be said that in the cretaceous formation at good depths there are rivers of water enough to justify the choice of this coast for safe resort. The success of the first well at Ocean Grove led to the sinking of one after another, so that now Asbury Park, Ocean Beach and Lakewood, Red Bank and several other localities have availed themselves of this supply. In Asbury Park water from these wells was brought to the doors of houses and tents at one cent per gallon, and although there are many good wells in the city, it was in great demand. Besides other sources of supply, there is every reason to know from geological facts and actual testing that all along the coast such wells can be made, many of which will be flowing wells and others within a few feet of the surface. They are also being made available to sustain the water-level in lakes, the springs of which have been somewhat cut off by buildings and other changes.

There are many causes for variation in amount of flow. The history of these wells and some of these causes will be found fully given in the report of the State Geologist for the current year.

It is important to recognize that many kinds of wells are now promiscuously called artesian wells. The only true artesian wells are those in which water rises above the surface of the ground from a depth below without any mechanical drawing. These may be natural, as the so-called boiling springs, or artificial, when by boring through the underlying strata or rock the water beneath is thus furnished with exit. These latter are known variously as bored wells, driven wells or drilled wells, according to the methods used for passing through

the overlying strata. If the strata or rock passed through is impermeable to the surface-water above it, it is safer than a well merely pushed or driven down through soft material. Not all deep or so-called driven wells are safe from surface-water. If a well is not tubed at least for twenty or more feet down, the very hole made may serve as a drain or conduit for surface-water to be mingled with the water below or to take its place. Salt or analine dye thrown on the ground has been known to appear in these deep wells after some time had elapsed. Even where piping is used to prevent water trickling along through the bore outside the tube, it is often best to fasten the pipe with a tamping of clay or soft cement, and the pipe should extend well above ground. The best material for tubing is wrought-iron pipe. It is common with some to coat the pipe inside and outside with asphaltum or black oxide of iron, both to preserve it and to prevent so much of that unpleasant, but harmless, iron taste. Zinc, lead and galvanized iron pipes are not generally approved for this purpose. A constant, abundant and pure water-supply is one of the greatest securities for the prosperity of a community, and can now be guaranteed to all except those who persist in the use of surface wells, so liable to become charged with organic matter. The circular upon pure water, issued this year by the Board, has proved to be of much service in aiding cities and individuals in approximate test as to purity. But the greatest security is in the right location of sources and in guarding against all those evils now so well understood. While the boiling of water, and filters and precipitation may be of some service, we should never be content with anything less than water which does not need such cleansing.

MALARIA AND MILL-DAMS.

The attention of the Board has not been drawn to the prevalence of malarial fevers in the State as much as in previous years. It is, however, when there is not a general prevalence of any disease that we are best able to single out those localities in which they most abound, and which are most frequently the head-centers of causation. While it is so confidently asserted that forced vegetable decomposition, insufficient drainage and the rapid fall and rise of streams has very much to do with these fevers, and with all forms of chills and fevers, it is recognized that there are seasons in which atmospheric conditions

most effectually co-operate and bring out the evil otherwise latent. But where any locality maintains a constant tendency of malaria we may be very sure that local causes are in operation which are the more easily located and identified.

There are a few places in this State in which chills and fever are always endemic. The reports of medical societies, and the yearly records of death, show that they are permanent residents. Our attention the past year has been called to three very marked contrasts. We have had occasion to visit Bound Brook, where occurred the notable mill-dam trial, and where, at one time, the entire population was prostrated by the various forms of malarial fever. It could not then be denied that every year witnessed many cases of the disease, but that year the sudden wilting of swamp vegetation and sudden atmospheric and rain-water changes caused a sudden increase. Since the removal of the dam, and the drainage of the swamp, chills and fever have well nigh totally disappeared. Besides the testimonies of physicians and landowners, workingmen assure you of the blessings of their deliverance, and all testify to the marvelous change. In other sections, in Essex county we find amid the Oranges some of the choicest homes in the State and a plateau of land naturally very free from all malarial influences. But there is a single stream which flows by a tortuous and often sluggish course into the Passaic, which has on it five mill-dams in the course of about as many miles. Diversion of water by artificial ice-ponds, and the use of the upper brooks for city sewer purposes, has added to the pollution of vegetable decay. It is now notorious that sickness prevails in its immediate vicinity, either in the declared forms of periodic fevers and ague or in that more obscure form of general malaria, which is also evidence of unhealthy conditions. Unless those dams which most impede the stream are removed, and pollutions of it avoided, natural drainage will continue obstructed and the people will continue to experience the ill-effects. Again, along the upper Delaware chills and fever continue to abound. The stream itself seems to have some special aids to the accumulation of rich alluvial deposits. Besides this, mill-users, of high and low degree, so erect and use mill-dams as much to impede natural flow. The Delaware early attracted the attention of those seeking water-power, and under the various names of dams, sluices, feeders, etc., water was impounded. Often this has been done at points where proper drainage is too much hindered, and where the use of steam

should now replace that of water. At Milford, Frenchtown and other points there is still much need of relief. The time has come when sanitary and hydraulic engineers, with the aid of geologists and physicians, have little difficulty in deciding between those places in which mill-sites may be maintained with advantage, and those in which water can not be so impounded with safety. In no State are the facts more accessible than in our own. While no one should be deprived of any acquired rights without compensation, there should be, both on the part of owners and the public, a disposition to respond to the needs of public health.

CARE OF STREAMS.

The whole subject of the care of streams and rivers is one that demands the careful attention of the public. These are the natural drainage tubes for the various water-sheds of the State, and are not to be impeded or misapplied, unless there is compensation and adjustment. Some few can be used for other purposes, as well; others can only be used when the interferences made are well understood, and are compensated for by adjustments which make up for the changed conditions; others still, must be left to their own natural flow, and even be so protected and enlarged as to make up for the demands made upon them by growing populations.

It is a nice, and yet a determinable, point to know what streams need preservation just as they are; what ones need enlargement; what ones admit of mill-sites or other obstructions, as for water-supply, reservoirs, etc.; what ones are capable of transforming sewage, and so serving as sewers of delivery. All these are questions upon which venturesome and unintelligent opinions are too often given.

But, if we take any three or five leading authorities on such matters, and allow them to make full examination, it is remarkable how fully they are found in accord. All new ponds and lakes, or extension of old ones, all new impoundings of water for any purposes, all ice-ponds, all increased pollution of rivers, all new feeders or canals, should be resisted by local health authorities until those competent have passed judgment that they are not likely to endanger the public health. The obstruction or pollution of streams seems to be so much a part of original depravity that it is very likely to occur, unless there are those who are resolved it shall not take place unless the propriety thereof is duly certified. This vigilance on the part of Health

Boards and the public will prevent much evil. In the case of obstructions already established, while there must not be too hasty judgments or a tendency to destroy, without compensation, there must be an honorable desire to get at the facts, and then to do that which public policy and personal health demands.

We are the more emphatic as to this because this State has so many rivers, and so many natural water-sheds; because there is such demand for water service for all purposes, from the mill-dam and factory-dam to the ice-house and the lake resort, as well as those other pockets for stagnant water so often made by railroad and mining excavations.

Each local Board should fully learn of all these conditions, and should be watchful against encroachments upon water-ways. The State has now an excellent system of drainage laws, and localities, without large expense, can avail themselves of reports as to local indications.

DECAYING WOOD, SAWDUST, ETC.

In connection with the subject of malaria, the effect of decaying wood and of heaps of sawdust on disease, has attracted much attention.

It has long been recognized that the decay of wood, like that of other vegetable matters, is attended with putrefactive changes. It contains nitrogenous compounds, and so is subject to all that type of decay which is known in the changes of albuminoid substances. It is to render these albuminoids in wood less soluble that various chemical methods of preserving wood have been proposed. Practicing physicians have often noted that the decaying wood of cellars and cellar floors of negro cabins, etc., seemed to be associated with disease. Dr. Cabell, of Virginia, has noticed endemics of typhoid fever as associated with the tearing down of negro quarters, either from the decay of wood or its absorption of foul particles. Streams which have been greatly filled with decaying timber, have been noted for their unhealthfulness. Professor Brewer, of New Haven, in the fifth volume of the papers of the American Public Health Association, shows, by a series of experiments, the greatness of these putrefactive changes, and the abundant growth of septic ferments.

The changes which all woods undergo in the process of decay, the gases and putrefactive particles therefrom, and the various forms of

fungous growth, while incompletely studied, are so far recognized that we need to study them as related to health. Dry-rot or wet-rot of floors and buildings, decaying barrels and boxes in cellars, the changes in docks, and lumber submerged in fresh or salt water, or alternately submerged and exposed—all these are inquiries bearing on the public health. As to wooden docks there can be no doubt that from this, and associated causes, they are often a peril to health, and should, as far as possible, be surperseded by iron structures.

Perhaps the most accurate evidence as to the power of decaying wood to cause disease, especially that of a malarial type, is that afforded by investigations into the effects of decaying sawdust. In parts of Canada this has led to a close investigation, conducted by chemists and by the Ontario Board of Health. The commission appointed to report upon the malaria epidemic in Coboconk, use the following language: "As to whether the presence of decomposing sawdust, in large amounts, is a sufficient explanation of the prevalence of malaria in the locality would seem to be beyond reasonable doubt, from the fact that its chemical composition is of much the same nature as the vegetable mould of the prairie, which, when exposed to the air and decomposing, is known to be the cause of the wide-spread prevalence of malarial diseases. In addition to this fact, we have many well-known instances where malaria has been practically unknown in districts, until such time as the sawdust from mills had been exposed to the action of the atmosphere for several years, when, decomposing, it generated gases similar to those of organic compounds in general. * * * At Fenelon Falls the sawdust of the mills there had been spread out over the open commons and left to decompose. Malaria followed, but later on a kiln was built, in which all the sawdust has since been burned, a great decrease in the prevalence of malaria following as a result. No malaria occurs along the Gall river until some saw mills, seven miles above Coboconk, are reached." Similar facts are stated as to other localities in subsequent reports. A summary in the last report, after years of observation, says: "Where deposits of sawdust occur along the shores of streams, but more especially on those of bays and ponds, and undergo fermentation and decay, malarial diseases and other results, injurious to health, have very frequently followed." Sawdust is so harmless at first that it is piled and spread freely, but it is when decay begins that its evils are experienced. As this depends upon heat and moisture, it will vary

as to time and degree with the locality of the heaps. In Michigan the matter has received legislative attention, and the State Board of Health has declared it "practicable and desirable that sawdust should be kept out of streams, ponds and lakes." Prof. Kedzie refers to the subject thus: "The water of places where sawdust finds its way into streams, is highly dangerous, not only from what it actually contains, but from bacteria that it may produce and support. Examination of well-water, from four different sawdust areas, gives the following results: These waters contain an amount of organic matter sufficient to condemn them for potable and culinary uses. They all contain resinous and extractive matter in solution; they all contain nitrogenous material capable of yielding albuminoid ammonia greatly in excess of the sanitary limit; they contain all the chemical elements necessary to sustain low forms of plant life. In the presence of so large an amount of organic matter and the chemicals of plant life, these waters may become dangerous by nourishing and reproducing the germs of epidemic diseases, should they find lodgment therein." Dr. Hargis, a careful observer on the west coast of Florida, where malaria is so rarely found, informs us that so far as he knows it always has a saw-mill as its center. These facts are not only important in themselves, but as connecting the decay of vegetable fiber, under certain forced conditions, still more clearly with the etiology of malaria. There are many streams which ought to have a sanitary patrol each year, not only in order to prevent sewer pollution, but also that logs, branches and all vegetation, easily removed, can be taken from them.

ICE-PONDS.

One of the frequent uses now being made of small streams and lakes is the formation of artificial ponds for the production of ice. We have seen several miserable specimens of these in the State. Many of them are excavations of marshy land, which not only furnish no good ice, but which in summer are either stagnant ponds or dry holes for the manufacture of foul air, or for providing good air with injurious organic particles. A law passed last winter to some degree protects cities, but should be extended to apply to townships. Any Board of Health is now justified in resisting the formation of ice-ponds where they believe it shall be injurious to health, and such regulation of, or interference with, those already formed, as facts as to their injuriousness justify.

It is also a mistaken idea that freezing fully purifies water, since several outbreaks of sickness have been traced to the use of impure ice.

Professor R. Pumpelly, of Newport, (*see* San. Eng., February 16th, 1882,) in the course of his experiments for the State Board of Health, had occasion to make tests as to the presence and susceptibility of living germs. He says that he thinks there is no doubt that ice can convey any disease that the water from which it is frozen can convey, in so far as such diseases arise from the germs of low vegetable organisms. Ice in freezing does not destroy or free itself from these organisms, as shown by the fact that samples taken from the center of blocks of ice, in every instance infected sterilized beef infusions with the germs of putrefaction. Ice in the act of freezing does expel certain gases and foreign substances, and, with the important exception above made, is somewhat purer than the water on which it forms. The outbreak of sickness at one of the hotels of Rye Beach, New Hampshire, in 1875, seems to have been proved to have resulted from impure ice.

"After the ice was suspected as the cause, it was found that it had been cut off from a small stagnant pond situated near the sea, until within a short time connected with the ocean, and into which a small brook entered, bringing a quantity of *sawdust from* several sawmills. The pond contained a large amount of decomposing matter, and the gases arising from it in summer were very offensive.

"A portion of the ice was carefully melted, and was found to contain considerable decaying vegetable matter in suspension. A chemical examination was made, with the following results, which are, for comparison, placed by the side of the results obtained from the examination of ice of good quality:

"RESULTS EXPRESSED IN PARTS IN 100,000.

	Rye Beach Ice.		Boston Ice.
	Unfiltered.	Filtered.	Unfiltered.
Ammonia	0.0208	0.0213	0.0045
Albuminoid ammonia	0.0704	0.0165	0.0050
Inorganic matter	7.80	6.88	0.45
Organic and volatile matter	5.72	2.84	0.31
Total solids at 212° Fahr	13.52	9.72	0.76
Chlorine		3.23	0.02

"It thus appears that ice cut upon a very foul pond was itself foul, although, of course, the ice-water was not as bad as the pond-water. A sample of the latter was examined in the summer of 1875, taken under as favorable conditions as possible, with the following results:

Ammonia	0.0197	in 100,000 parts.
Albuminoid ammonia	0.0597	"
Chlorine	34.00	"
Total dissolved solids	72.96	"

"These results should be compared with the filtered ice-water above, and it will be evident that the water in freezing rejects some foreign substances. This is not, however, a purifying action, but amounts practically to diluting the objectionable matter or bringing a smaller amount at one time into the system. On this account, safety demands that ice should not be cut for domestic use on ponds or streams which are so polluted as to be rejected for water-supply."

The evils result from the use of ice from shallow or stagnant or artificial ponds. Some of the States have laws upon the subject, and our own Legislature at its last session passed a law prohibiting the cutting of, or sale of, ice in any city without a permit, where the Board of Health saw fit to pass such an ordinance.

CEMETERIES.

A bill passed by the last Legislature in reference to cemeteries is likely to be of much service. It has been revealed that some cemetery associations pursue their vocation with the highest methods of commercial pressure, and seek to fill their cemeteries with bodies, without regard to the fitness of locality or to the evils of over-crowding. Some of them have become cities of the dead in which the tenement-house system is applied, all the more vigorously because the ground conceals the massing of the bodies. While such abuses do not exist to a very large extent, they showed the need of some oversight of burial-grounds and cemeteries by local Boards of Health, and of a law which gives the local Boards some power over choice of locality and management. Where cemeteries are located close to city limits, and are surrounded by built-up village or town streets, the evils of intramural interments are easily repeated. It is believed that we now have a law mild enough in its restraints, and one which serves to draw the attention of cemetery associations to the duty they owe

to the public. In some cases the receiving vaults need better construction and more skilled oversight. The location of cemeteries within city limits should be stoutly resisted even when the parts least likely to be built up are selected.

SCHOOL HYGIENE.

This Board has long recognized that whatever it is desired to have appear in the type of a nation it is desirable to recognize in its public schools. The interests of the body and its care in the years of school life must not be overlooked. It is the first business of trustees and others in charge of school buildings to see to it that the child who goes to school shall not there find anything that will be a risk to health. Still more, he should find there such guidance and instruction as to physical education as will enable him to appreciate its importance, and to secure such information as will enable him to put in practice the laws of health. To this end hygiene needs to be understood by our teachers, and proper instruction and training needs to be secured. We are glad to state that the Superintendent of Schools, the State Board of Education and the Trustees of the Normal School have so far appreciated this as that it has been directed that weekly instruction be given in hygiene, and that examinations be had thereupon as in other departments of study. We believe this will greatly aid in the physical care of the pupils, and that the example will soon be followed in most of the largest schools of the State.

LOCAL BOARDS OF HEALTH OF TOWNSHIPS.

These divide themselves into those that are for townships and those which have been formed in cities, towns, etc. As a rule, each city and town has its own Board of Health. The exceptions are where some very small borough or town, governed by a commission, has been formed, in which the township assessor and township committee still have relation, and in which it has not been seen fit to form a town Board of Health in place of the township Board. A township Board of Health is composed of the township committee, the assessor and the township physician, if there actually be such office or such officer. This generally means the physician to whom the care of the poor has been assigned by the appointment and election of the town committee.

Where there is no such mode of appointment, the township committee or assessor should apprize the State Board of Health of the fact. It then appoints a medical member for the Board. If there is none resident in the township, one may be appointed from an adjacent township. It is important that some one be selected who is really interested in local health matters, and who, both by his knowledge and judgment, can do much to aid the Board. Circulars XXXIX. and LIV. should be carefully read over by each member of the Board. The Board should acquaint itself with the various circulars issued by this Board for general distribution, and by these and other means seek to give sanitary information to the people of the township. We have had many instances illustrative of what signal advantage members of a Board can thus be, in imparting information and in drawing attention to the importance of sanitary care. In the case of very many evils complained of, prudent men will be able to secure their abatement without any severity either of language or of law. It is our experience that most men are unwilling to cause nuisance or be a detriment to the public health. They do not know, or they have come themselves so to tolerate the nuisance as not to realize it, or they are prejudiced by the cost of its removal, or imagine that objection arises from persons over-particular, or from some personal grudge. Generally they will be able to disabuse their own minds by seeking the private judgment of some who are often brought in nearness to the evil complained of. While Boards are not mere bodies of persuasion, and while time must not be lost in cases of peril, it is wise that some effort be made to get clear of the nuisance without process of law. Many need to be reminded that, in the eyes of the law, that is a nuisance which is detrimental or hazardous to the public health, as also anything that so affects the ordinary citizen as to produce repeated physical discomfort. Section 7 of Chapter CLV., Laws of 1880, (see Circular, page 7,) tells under what circumstances they need to examine as to nuisance, although, as themselves, freeholders and tenants, they can do it of their own accord. Section 8 prescribes one mode of procedure, and Section 10, Chapter CV., Laws of 1883, (see Circular LIV., page 15,) another mode. It is generally well, before either procedure, to give the notice, page 22 of Circular. If the township has passed no ordinances as to the public health, its mode of action is clearly defined in Section 8, Chapter CLV., Laws of 1880, (see page 8 of Circular,) or it may at once, as a Board, avail itself of the provision above re-

ferred to, Section 10, page 15 of Circular. If resisted in any form, when proceeding under Section 8, Chapter CLV., Laws of 1880, the inspector or member of the Board so resisted should use the ordinary methods as to resistance of an officer or assault. The following is a recent case:

It occurred as to a small hotel in Asbury Park, New Jersey. The owner of this property caused a well to be placed a few feet from a vault. The Board of Health protested against this proximity of vault and well, and caused an examination of the well-water to be made by a State Analyst. The water was found to be polluted. The tenant was then requested to discontinue the use of the well-water, and to close the well by removing the pump. This demand of the Board not being complied with, a Health Inspector was sent to close the well. An ex-policeman was employed by the tenant to resist the health officer and prevent the closing of the well. The resistance consisted by standing between the officer and the pump, and thereby making it impossible for the Inspector to perform his duty. The man was arrested and a warrant procured for his detention from a Justice of the Peace. He was indicted by the Grand Jury, and was convicted of assault in his trial before the Court of Quarter Sessions of Monmouth county, at the November term. This is the first case of this character which has been brought to trial in New Jersey, and the verdict of the jury will do much to strengthen the position of the Boards of Health in this State. The result of this prosecution shows that simple interference with a health officer, thereby preventing him from obeying instructions from a Board of Health, constitutes "an assault" under the law, and subjects the offender to severe punishment.

He having notified the person under the first law and having been resisted in removing the nuisance, while it renders the person liable, does not prevent recourse also to chancery. Because, however, it is often more satisfactory to proceed against a person before a justice, for having disobeyed an ordinance of a Board of Health, and to recover fine, many of the townships, and especially those having populous villages, prefer to act as provided for in Chapter CLV., Laws of 1882, and to pass in accord therewith such ordinances as they deem necessary. (See Section 5 of this act, Circular LIV., pp. 11 and 12, and outline of Code for Townships in this report.)

This is the plan generally to be recommended in all thickly populated townships.

The chief mode in which a Board of Health is to be provided with money is given in Section 3, Chapter CCXXV., Laws of 1885, (p. 18 of Circular.) In cases needing special investigation, the State Board is allowed to aid to the amount of twenty dollars.

Township Boards of Health should apprize the State Board when, in their judgment, a local inspector is needed. The State Board can, with or without such notice, act in accord with Section 4, Chapter CCXXV., Laws of 1885, (p. 18 of Circular.) Such, together with the circular itself and the laws in general, is a brief outline of mode of procedure. But no such outline can take the place of a thorough looking-over of the law, to find out various other duties. Besides, the local Board is often, as under the Drainage Laws and various others, the moving force toward securing what is needed for the public health, even when it does not act in its official capacity. Now and then, in some small and healthy township, the town committee, assessor, etc., assume that there is nothing for them to do. Here is a specimen of results:

"During the last three weeks, eight or ten cases of enteric fever have been admitted into St. Michael's Hospital, Newark, all of whom came from Sayresville. I thought best to call your attention to it, and you can investigate if you think proper."

The following is the report of one of our District Inspectors:

"On visiting S. I found that Dr. D., who had attended the men at the brick-yard, had left the township the week before. A number of men from different yards had been sent to the hospital at Newark, but none had been sent during the past month. I made an inspection of the brick-yards. I found that it is the custom to have the men live in shanties, which are about fifty feet by twenty feet. Each house has a dining-room running the whole length of the building, on the ground floor. Above this is one large sleeping-room. Each house contains from forty to sixty men.

"The water-supply is from wells, which are placed within ten feet of the door of the house. Some of the buildings had only a single privy, and none of them had privy vaults. The waste-water and slops are thrown close by the door or right in front of the wells. The smell around the houses was very bad indeed. There are no cases of sickness in any of the yards at present, and as they stop work this week for the season, and the men leave the place, there is no danger of any more cases now. Of course, there is danger of some of the men carrying the disease elsewhere. I insisted on an entire change in the

condition of the shanties for the next season, and a thorough cleaning-up and disinfecting of the buildings and surroundings.

"I think it would be well for some officer of the State Board of Health to visit the place in the coming spring."

LOCAL BOARDS OF HEALTH OF CITIES.

These are now formed as provided for in Section 1, of the amended law, given on page 6 of the Circular. Their usual method is to proceed at once to pass ordinances and so apply the law. Chapter CLV. Laws of 1882, pages 10 to 12, of Circular LIV., as also Chapter CLX. (1884), page 13, which is especially applicable to cities, etc.

These also generally give notice to parties, although the law does not absolutely compel this or prohibit action for a nuisance which has not been made a subject of ordinance. Cities, too, may avail themselves of the various forms of procedure already noted.

The mode of raising money for city Boards of Health is given in Section 3, Chapter CLIX. Laws of 1885, page 17 of Circular.

In every city of over 2,000 inhabitants, Section 2, Chapter CCXXX., Laws of 1885, (page 18 of Circular,) requires a Sanitary Inspector.

It is one of the most pleasant results of well-organized Boards of Health, that they are able to prevent or abate thousands of nuisances without recourse to any of the penalties of law. Where the offense is plain, and there is resistance sufficient, law is now provided.

It is worthy of note that two of the largest cities of the State—Newark and Camden—finding their charter methods of procedure ineffective, have now organized their respective Boards under the State law. This places the State, as a whole, under special and definite laws for the protection of the public health, so that now each city and township has the plan of organization and the power for effective administration. With the appointment of competent local Inspectors in the cities and more populous townships, and with a proper oversight on the part of the local Boards, it is possible to preserve very many lives, to diminish sickness and invalidism, to add to public and personal comfort and to the working capacity of our people.

HEALTH INSPECTORS.

In the interests of health, there is no more important service than that of a Health Inspector. He should be a man made competent

for his service by a careful study of the means of preventing various nuisances, and the best methods of preventing and removing them when they occur. Some knowledge of chemistry, of physics, of plumbing and of the various appliances most in use is very desirable. He should know well, how to deal with those with whom he has to meet, and must realize that an Inspector is generally not welcome until, by his good service to individuals, to families and to the city, he has shown himself to be a public benefactor and not an inquisitive place-seeker. There is need of a real interest in the health of the people, a knowledge of the means of promoting it and a prudence in administration which knows how to temper firmness with kindness. In the work of sanitary inspection a system of visitation and of record is indispensable. While there is ever occasion for special inquiries into particular complaints and special nuisances, no city, town or borough has a satisfactory inspecting method unless, first of all, each house has been visited and a record made as to it. This Board has prepared a hand-book for this purpose, showing how it is to be conducted and how the record is to be kept. This must be placed on file and reference made thereto when any new inspection is made. After a street or the whole city is completed, a summary should be made, so that it can be stated how many houses have inside closet arrangements, how many have cesspools, how many are ten feet, fifteen feet, twenty feet, etc., from house or well, how many houses use well-water and all other facts of a sanitary bearing. With this, and with the records of the vital statistics, the health officer has what the manufacturer would call the plant. There is the basis for work which is intelligent, methodical, accurate, instead of that spasmodic or routine work which waits for nuisances and displays its only activity in abating them. This is useful, but that there should be a nuisance to abate where it could have been prevented is always the mortification of the true Sanitary Inspector. Chicago has thought this house-to-house sanitary inspection so important that it has appropriated $100,000 for that purpose alone. The Sanitary Inspector who trusts his wonderful memory will no doubt remember the house that has small-pox in it, and the one where he fell down the steps into a filthy cellar, but as to others will not know all those details which he ought often to have occasion to refer to. How simple and important a matter this is, the records of Asbury Park, for instance, will show. Paterson, also, for a large city, has made good progress in this

direction. The books for record are good in form, and can be had cheaply, or may perhaps be in part furnished by the State. Samples will be sent when requested. We have the past year furnished two for school-house sanitary survey and inquiry to each teacher of the State—one for the information of the trustees and one for file at the State House. The value of this methodical and recorded inspection is inestimable. It is the foundation of system in sanitary work. In the first attempt, it is not a visit of complaint or remedy so much as to get at the facts and record them. No doubt in some cases quick action is needed, but in general it is preparatory to that information, persuasion or enforcement which is needed in so many homes. In cities thus cared for, life becomes more valuable, freer from sickness and the power of individuals for labor is increased. Thus local and public prosperity are the direct results in this increase of the capital of health. This State has wisely provided that every town of 2,000 inhabitants shall have an Inspector, and has furthermore authorized the State Board of Health to require an Inspector in such townships as, in their closeness of population or in other respects, have localities that approach town and city conditions. We apprehend great benefit from these provisions when they come to be fully and systematically applied.

Whenever any ten of the Inspectors of the State request a week of special instruction in details of duty, the Board will arrange a systematic study and course of instruction, without expense. There is now a real demand for real and competent Inspectors.

It is the great desire of this Board to help all Inspectors in their work. The reports of this Board, so far as accessible, should be carefully examined. Any Inspector who will send us his name and address will receive, from time to time, the various reports, circulars and instructions issued by this Board. Hereafter, we desire that all Health Boards should send us the name and post-office address of Inspectors, with the annual October report, as also notice of any change that may occur during the year. We refer to the following books in this library, or that can be procured by Inspectors, as especially valuable to them:

Hand-Book of Hygiene: Wilson. Lindsley & Blakiston, Philadelphia.

Sanitary Science: Burn. Spon, 34 Murray street, New York.

Laws of Health: Corfield. Spon, 34 Murray street, New York.

Dwelling Houses: Corfield. Spon, 34 Murray street, New York.

Dirty Dust-Bins and Sloppy Streets: Boulnois. Spon, 34 Murray street, New York.

Manual of Public Health: Hart. Spon, 34 Murray street, New York.

Hand-Book of Rural Science: Marsh. Spon, 34 Murray street, New York.

House Drainage and Sanitary Plumbing: Gerhard. Van Nostrand, New York.

Sanitary House Inspection: Gerhard. Spon, 34 Murray street, New York.

Hygiene: Newsholme. Spon, 34 Murray street, New York.

DISTRICT INSPECTORS.

Under the act passed by the Legislature of 1885, authorizing the appointment of District Inspectors, the Board has been able to extend its own supervision, and to secure, where needed, effective coöperation.

In May last, the following circular was issued:

"OFFICE OF STATE BOARD OF HEALTH,
"TRENTON, N. J., May 15th, 1885.

"Under a law passed by the Legislature of 1885, the State Board of Health is allowed to appoint Sanitary Inspectors to assist in promoting the interests of public health throughout the State. The Board has thus far made the following appointments:

"Henry Mitchell, M. D., Asbury Park, for Monmouth county.

"William K. Newton, M. D., Paterson, for Passaic and Bergen counties.

"James Mecray, Jr., M. D., Cape May City, for Cape May county.

"James Owen, C. E., Newark, for Essex county.

"James H. McGuire, Trenton, for Mercer county.

"D. B. Ingersoll, M. D., Mays Landing, for Atlantic county.

"A. V. N. Baldwin, M. D., New Brunswick, for Middlesex county.

"Wm. H. Iszard, M. D., Gloucester county.

"These will be termed District Sanitary Inspectors, and will attend to the counties in which they live, or to such adjacent localities as may be designated.

"The object will be—

"I. To thus have persons ready at hand who are familiar with the health laws of the State and with the details of their administration, so as to advise with and direct local Boards of Health in their work.

"II. To see that proper organization of Health Boards is perfected, where it has been omitted, or the plans therefor not understood.

"III. In case of sudden outbreaks of disease, at once to render such assistance as may be indicated, or as local Boards may desire.

"IV. To secure or aid in the sanitary inspection of schools, almshouses, jails or other places of public assembly or detention.

"V. To secure a more general vaccination, and a knowledge of the methods of preventing communicable diseases.

"VI. To aid local Boards in the enforcement of the laws as to vital statistics, as to adulteration of foods or drinks, as to dangerous kerosene, and as to the contagious diseases of animals, etc.

"Local Boards of Health now have ample powers, and the recent laws provide for the raising of money for health purposes in cities and in townships.

"If Boards of Health, or Assessors and Town Committees will notify the District Sanitary Inspector of their desire to have him meet with them and explain more fully their duties and powers, he will be glad so to do.

"By order of the State Board of Health.

E. M. HUNT, M.D., *Secretary*.

"District Inspector."

Care has been exercised to choose persons who have special knowledge, or have shown special interest in sanitary matters. We need those who are fully acquainted with details, as well as with general laws and principles. Many of the local Boards need to have some such assistance ready at hand, in addition to that given by personal visits of the Secretary or other members of the Board, when necessary. The reports of these District Inspectors, as outlined and condensed by Dr. Henry Mitchell, will show the work attempted or accomplished.

SANITARY LEGISLATION.

The past year has been one of considerable importance as to the health laws of this State. The laws under which Boards of Health had been formed in the townships and the cities of the State were quite different from those by which the committees of chartered municipalities or township committees had exercised a jurisdiction over some matters relating to health. Under these a Board of Health had no efficient existence. In case its powers were disputed, the enforcement involved so many steps of procedure, and gave rise to so many technical questions of authority, as greatly to embarrass the administration of the laws. The various acts which have now been passed, recognize that while certain relations between the corporate bodies and Boards

of Health must be maintained, and while questions of large expenditure must have the approbation of the governing bodies or of the people, there must also be in the Boards of Health certain direct power, not the least of which is their ability to carry a case rapidly to adjudication by presenting it for summary proceeding to the Court of Chancery.

The various laws relating to the public health, so far as they have emanated from or come under the advisement of this Board, although approved in their passage by good legal authorities, had not been subjected to the test afforded by cases carried up before the Court of Errors and Appeals. During the present year cases involving most of the principles and practices of these laws have come before the court. The result has been that the laws have been fully sustained.

While these laws give large powers, such as characterize most police measures, yet they are easily brought to the arbitrament of the higher courts, and so, if erroneously framed or administered, a speedy restraint is put upon them. It is equally true that local Boards which should so far exceed their functions as to be constantly interfering with minute or mistaken nuisances, would, in the very nature of their work, soon find themselves changed by the nominating and confirming boards of cities and boroughs, and by the popular vote of the townships. Thus there is no real danger of the invasion of personal rights. Indeed, it is far more common, under the best sanitary laws, for the public health to suffer from the acts of single persons, than it is for persons to suffer wrong at the hands of Health Boards.

It is sometimes complained to us that local Boards do not do their duty for fear of a brief unpopularity. During the year we have printed an abstract of the most important laws, and an index of reference to others, which furnishes a ready guide to those who will carefully follow its outline or refer to the laws, of which the text is not fully given. The two laws passed by the last Legislature, Chapter CLIX. and Chapter CCXXV., have, in their application, fully vindicated their passage. By them the local Boards have been assured of an amount of money sufficient to meet those incidental expenses which necessarily occur. Also, the State Board has been able to appoint District Sanitary Inspectors, who have proved invaluble in the sections in which they have had oversight. All of the money appropriated for this purpose has not been expended, simply for the reason that the Board was not able to find persons competent for this special work, who had

the time to devote thereto. But it is believed that with care in selection, and with more experience in the details of such inspection and oversight of local Boards, we shall be able greatly to increase the value of the service in this direction. The text or reference to some of the legal decisions made are to be found in this report.

CARE OF RAILROAD STATIONS AND PROPERTY.

In March last a letter was addressed to the officers of the various railroad companies of the State as to the need of more skilled oversight of the various conveniences of their railroad stations. It was as follows:

"TO THE OFFICERS OF
"RAILROAD AND TRANSPORTATION COMPANIES
OF THE STATE OF NEW JERSEY.

"TRENTON, N. J., March 16th, 1885.

"GENTLEMEN—The State Board of Health of New Jersey has the honor to address you in the interest of public health in this State. Not only because of anxiety as to the possible introduction and spread of cholera, but because of the intimate and constant relation between public conveyances and the spread of disease, we earnestly advise an expert sanitary inspection of all the property belonging to your respective companies.

"We are aware that some of the very best methods of structural arrangement and management are illustrated in some of the cars and stations of the various lines of railway. We are also aware of defects and neglects that are a menace to the health of the traveling public, and to the localities in which the buildings of your respective companies are located.

"The attention to rooms, cesspools, closets, water-supply, etc., too often devolves upon those not capable of skilled oversight and not acquainted with thorough modes of construction, cleansing and disinfection. In times of epidemic, these public places are especially hazardous. At all times they are subject to such general and frequent use as to make it needful to have a very watchful care and some system of inspection.

"At a meeting of this Board, held at Trenton, March 10th, 1885, this circular was directed to be transmitted to the officers of all companies doing business in this State.

"By order of the Board.

"E. M. HUNT, *Secretary.*"

Some kind and prompt responses were received, but it was found little was being done. The Board then authorized one of its Sanitary

Inspectors to make a tour of inspection and accurately report the result. These reports were at once forwarded for the information of railroad officials, and at once commanded attention. Some entirely unexpected defects were reported. The result has been not only a more comprehensive plan of inspection, but a special order as to sanitary care and much change in the methods of disinfection. In some cases skilled inspectors have been placed in oversight. We feel confident that, for a time at least, there will be much improvement, but each local Board should see to it that no such properties within the limits of their jurisdiction become a center of inspection. Complaints made as to the transportation or careless deposit of fertilizing material, have been duly brought to the attention of the companies.

HEALTH RESORTS.

During the last year our State has well sustained its reputation as a place of resort for those seeking health and recuperation. It is believed that the aggregate of visitors has been greater than during any preceding season. Not a few of these become permanent residents. Their children form attachments which are local, and so whatever invites to summer residence also secures eventually a permanent increase of population. It is very noticeable how many have thus come to identify their interests with the State. It is one of the many illustrations of the fact that State and local care of public health has a great social and financial value. For the very name of "health resorts" shows that these places are first sought because of their pure air, good water and healthfulness of soil. Hence it is of the very first importance that the natural qualities of soil and purity of location be fully preserved. This will not be done unless there is organization and direct supervision in the interests of health on the part of the local authorities. We could cite many instances to show how those from other States have valued this care, and have admitted that New Jersey is far in advance in its sanitary oversight of localities. The details of care, for instance, at Asbury Park, are as exact as in the best English cities.

It might be argued that those who build for health, or who build large hotels for rental, will, in their own interest, secure the best sanitary conditions. This is far from being the case. Concealed work is slighted, or the most crude methods of disposal of sewage adopted.

We have had occasion directly to interfere in the arrangements of some of the hotels. In one instance we were about to take such measures as would dismiss all the guests, and would have been able to rest for defense on the facts in evidence. We can report for this year a better success on the part of local Boards than in any previous year. Not only is their advice generally listened to, but in many instances they have been able to enforce more stringent regulations. In addition to the usual number of visits and inquiries made by the Secretary of the Board, a District Inspector in each of the counties of Monmouth, Atlantic and Cape May has much aided local Boards. Former reports have had occasion to speak with anxiety and with some reproach as to the evils accumulating at Long Branch from the want of a sewer system. It is a great pleasure to strike out from the printer's proof what we again had occasion to say still more plainly, and to substitute in its place the information that the citizens have just perfected a thorough plan of sewerage, and that the engineers are already at work. Although there have been no serious results thus far identified, the state of things which has existed could not be continued without great peril. The good water-supply has, no doubt, helped to prevent the hurrying of results which happen where the water is derived directly from the soil. But it is not well to live along rows of pools of stored filth, even if the drinking-water is not derived from the adjacent soil, and we trust that another season will not pass without decided changes in the structural and other methods of disposing of the great quantity of fouled liquids, always furnished daily where there is an abundant water-supply.

It is not necessary to speak in detail of all the places visited. We now know of no prominent health resort without its local Board of Health. By visit and correspondence, these Boards are becoming more familiar with their duties, their privileges and the powers of the various laws under which they act. There is much need of some law to regulate the relative location of wells and outhouses, as also the plumbing of such as have closet and bath conveniences. There is one fault which is quite common to the most of these summer cities and villages, and which is not fully reached by local Boards of Health. When the time for the fall flight comes, it is often sudden and rapid. Hotels and private houses are deserted without any of the proper fall house-cleaning. Visits to the kitchens, laundries and other parts of hotels and boarding-houses often reveal an amount of decaying and

putrescible matter left behind, sufficient to cause much foul air in the late fall or in the warm days of the spring. The entire building is thus made a retort for holding foul air until the next June. We attribute to this cause as much as any other the occurrence of undoubted occasional cases of septic or typhoid fever at these resorts. A town is often thus said to be unhealthy, when it is merely the bad management of single households. In one of our coast cities much good is done by notices from the Board of Health, so that many who are warned put the house or hotel fully in order at the time of leaving. If only personal faithfulness will combine with public effort, the thorough summer healthfulness of these delightful resorts will be assured.

CHOLERA.

It is with great satisfaction that we have to report our exemption from cholera during the past summer. Its fearful ravages in Spain, in France, and to some degree in Italy, assure us that it is the same dreadful scourge that has so often desolated many lands.

In Spain the official report gives the number of cases to November 1st as 273,808; the number of deaths, 101,448. This is believed to be below the real numbers.

Recounting the history of former European epidemics, this country can never be regarded as safe from an invasion of cholera so long as it is occurring in parts with which we are in constant communication, and so long as conditions exist here favorable to its propagation and desolation. One can not read the many reports from our Consuls in Europe, in 1884, and especially those of Mr. Mason, as to Toulon and Marseilles, without recognizing that we can not altogether claim exemption by reason of the better sanitary condition of our cities. Marseilles, especially, is believed to have a good and abundant water-supply. "The sewers throughout a large part of the city are admirably constructed and the pavements are probably as good as those of any European city. The failure of proper sanitary condition was chiefly in the amount of sewage thrown into the sea, which became so precipitated about the docks as to require dredging, and in the fact that the 'lower classes of people have generally the lax ideas of Southern Europe in respect to culinary and personal cleanliness.'" Yet when we take into consideration certain well-ascertained facts as to some of our own cities, we are compelled to admit quite similar conditions.

The great defects seem to have been in a want of well-sustained sanitary inspection, and that thorough sanitary organization which gets ready beforehand, and which is in complete order for dealing with first cases. Cities are not likely to be so cleanly but that an epidemic once under headway will find material, just as a great outbreak of fire is sure to find combustible matter.

Not less important than the diminution of the susceptible material is that thoroughness of preliminary organization which insures the most perfect administration. England was never so confident as now of its ability to prevent or control an invasion by cholera, because the methods of military discipline have been applied in sanitary law, order and police. And what is cheaper in the end? One hundred thousand people flying from Marseilles, although there were but 1,784 deaths, meant more of financial prostration for that city than can be reckoned by dollars. It is only systems of municipal and sanitary expenditure that prevent the wild waste and extravagance of epidemics such as were complained of in that city. This mode of systematic preparation is all the more important because it is as effective in dealing with the more common diseases and scourges, which, in the aggregate, destroy so many more than any one epidemic does. Since it is not claimed that any great advance has been made in the treatment of cholera, and since it is claimed that very great advance has been made in its prevention or its limitation by cleanliness, isolation and administration, it is better to trust to the latter than to place our reliance upon treatment only.

Whatever may be the doubts as to the essential origin of epidemics, these, or the speculations as to them, do not invalidate the fact that where many are immured in an atmosphere of decaying organic matter, some zymotic disease is invariably produced. A locality breathing an atmosphere perfectly pure may not be exempt from every communicable or transmissible disease, but observation has shown that for such districts epidemics are very infrequent or fatal to very few persons of good habits and general good health. Internal sanitary arrangements and not quarantined or sanitary cordons are the chief safeguards of nations. A salubrious city, in an epidemic, is like a city built of stone as compared with one of wood in a conflagration. Disease-proof homes are nearly as attainable as fire-proof buildings.

During the year some cases of Asiatic cholera have been reported

to us, but we believe none of them to have been substantiated. The case in Camden county was fully investigated, and certainly had no transatlantic origin. We had occasion to examine into one case in Middlesex county, which an experienced physician still believes to have been Asiatic cholera. But although there were the severest symptoms of cholera nostras, a full examination gave to us no evidence of the more virulent and communicable variety. Our attitude as a State must be that of armed preparation. This merely means that each local Board of Health must do its duty, and that Inspectors must see to it that there is no accumulation of filth as to persons, places or things.

SMALL-POX.

The ravages of small-pox in Montreal and the occurrence of some cases in the States, derived from that city, has anew turned attention to the importance of vaccination. It almost taxes the patience of medical men and of sanitarians to know that a disease which can be eradicated, should so often become epidemic. Every death is a record of the evils of neglecting preventive methods. We are not enough impressed with the ravages which small-pox would make if some of the people were not always secure. These, besides being safe themselves, are of great aid in caring for the sick and so diminishing fatality.

In a register kept in Kilmarnock, Scotland, from 1728 to 1766, it then being a town of from 4,000 to 5,000 inhabitants, we get some estimate of what a visitation of small-pox then was. It appears that there was an outbreak of the disease about every five years. "Each epidemic affected all or nearly all who were not disease-proof, and therefore its victims were almost entirely children under five years of age, who had come into existence since its last visit. Those who recovered were disfigured for life. There were in fact, says Dr. McVail, three Kilmarnocks. One had no fear of small-pox, for its people had already met it; some were blind, some were deaf, most were scarred or disfigured. The second Kilmarnock was under the green sod of the church-yard. The third Kilmarnock consisted of a band of about 500 little children which had yet to face the most terrible enemy it would ever meet. One can scarcely imagine what must have been the feelings of a mother during these visitations. Even when the town was free from pestilence, there would be the constant foreboding of its all-too-certain coming, and when at last the first case

occurred, it was a sentence of death to some member of almost every family containing little ones." The disease has not decreased in malignancy, but the prevention thereof is in the reach of every person and of every family. It is not necessary here to repeat the full information as to it contained in the sixth report of the Board (1882). Circular XLIV., to be had by any one on application by postal, gives all necessary details. Physicians are now very careful as to the sources of lymph, whether the humanized or bovine variety is used. The danger of receiving any disease through the blood of another person can now be wholly overcome by the use of the bovine lymph, although the risk from humanized lymph has been greatly magnified.

We urge upon all local Boards and all school trustees and all parents, to see to it that vaccination is well nigh universal. The law of this State as to school children is most important. While vaccination is not made compulsory, as in England, it is provided that children shall be allowed to attend school, without being subjected to that risk which the presence of unvaccinated school-mates would inflict upón them.

ADULTERATION OF FOODS AND DRUGS.

The Board has, during the past year, to some extent carried out the law as to the adulteration of foods. The milk law has been enforced as fully as present arrangements permit, and is found of great service in restraining the sale of watered and skimmed milk. It proves that there is little other falsification of milk except the occasional use of chemicals to prevent it from souring. The most usual fraud is that of selling various fats as real butter. The manufacture of beef and lard and other animal fats, and of cotton-seed oil, bené oil, etc., into imitation butters, has come to be so extended as to defy any ordinary powers of inspection. While the most or all of these, if rightly prepared, are not injurious to health, they have not for all purposes the value of good butter, and should not be sold as such. Examinations made of various articles of food and of drugs show that the addition of anything injurious to health is rare, the object generally being to increase bulk or weight by inert substances. The great evil is to the working people, who often thus get much less than the worth of their money, or who do not secure the requisite amount of nourishment, because the food used lacks in food value, or is more difficult of digestion. A thorough system of protection would require

an analyst in almost every town, and a Board of Health collecting specimens and conducting suits. Or, if the State Board of Health was fully charged with this duty, it would require thousands of dollars instead of the single thousand to which expenditures in this direction are now limited.

Under the present law, as it seems to us, the thing feasible to be done is for city Boards to be watchful over suspected falsifications, and for them to seek occasional test examinations of certain articles. In large cities where sufficient funds are provided there should be the Public Analyst. But where this is not the case, within proper limits the service of the Analyst for the Board can be had at the expense of the State. It is because of great doubt as to the wise expenditure of the money outside of such applications, that the full amount allowed has not been expended. Yet we believe the law has been of some service, and will be made by us of greater benefit in the future. In this report will be found the report of the Committee of Analysts for the year. Local Boards should give special attention to the sale of anything which is suspected of being adulterated, so as to be injurious to the public health. Correspondence will secure full directions as to modes of collecting specimens, as also of securing the aid of this Board and of our Committee of Analysts.

LIGHTS AND LIGHTING MATERIALS—THE PETROLEUM LAW.

Lights and lighting apparatus and materials have important relations to public health, not only in the care of the eyes but in the preservation of the purity of the air. A great amount of work has to be done by artificial lights and those who thus have to work, whether as scholars or as artisans, should be secured as far as possible against injury to the eyes or to the general health. Gas differs greatly in its quality and some of it gives off carbonic oxide and other deleterious gases. The quality of lights and the mode of their regulation deserves careful study in the interests of health. It is the great value of the electric light that it is free from all these defects, and when it is made more available by proper shades and fixtures it will become a desirable light for the school-room, the workshop and the places of public assembly. Kerosene, as furnishing a convenient and valuable light, is in such general use that its purity and safety need to be

secured. The law of this State as to it has proved of very great service. It is noticeable how few accidents now occur from actual explosions. Examinations of specimens show that most of the oil now in the market answers to the State requirements. The law has made it the policy of dealers to keep only oil up to the standard. Outside competition is occasionally started, but the companies themselves aid in watching this. The success of this brief law in protecting life in the State and at such small expense, has fully justified those who advocated it amid much active opposition. It still needs the attention of local Boards and notification to this Board where accidents from *explosion* occur or where impurities are reasonably suspected. Explosions now rarely occur. Most of the cases reported in the newspapers are from spilling of the oil or breaking of the lamp when lighted.

HEALTHY HOUSING OF THE WORKING POPULATION.

It is a significant fact that in England the protection of the homes of artisans and of all those who have to rent dwelling-places has become so prominent a subject of parliamentary legislation. It is equally significant that a political party in one of the chief States of the Union should have regarded it as politic to have in their different sections of its platform reference to the care of the health of the people and one special section as to the regulation of tenements. It is the social interest of the State and the interest of all citizens, independent of all parties, that the law, especially in cities, should have something to say as to the construction and oversight of houses in general and of those offered for rental in particular. Some people are beginning to see that health is a workingman's question and that to secure healthy habits, healthy food and water, a healthy home and healthy surroundings, is one way of increasing wages. It was an important item in the semi-decennial census of the present year that we were able to secure a record of the number of houses and so to have in each precinct a record of the number of families and persons to be found in each house. The Tenement House acts relating to New York and other cities, and the specifications for plumbing, drainage and water connection, as to traps and trap ventilation, iron pipes and lead pipes, their thickness and joints, as required by the Board of Health and its Sanitary Engineer, have proved most valuable as

social benefits. There is need of similar laws in some of the cities of this State. It is impossible to secure health where faulty or leaky structural arrangements furnish a constant supply of organic material to the inbreathed air.

CIRCULARS OF THE BOARD.

Especial attention has been given the last year to the preparation of a few circulars which were needed by Health Boards, by Inspectors and for the care of the school-houses of the State.

The collection of the laws in a small pamphlet, with reference to others, and such explanations as would aid in their enforcement, was made important because of their number and of the imperfections of index to some of them. These are now in the hands of all Health Boards, and are also valued by lawyers as furnishing more easy reference. Some of the directions as to mode of procedure will prevent errors on the part of local Boards in their first action and enable them to know when to seek legal advice.

The circular for Inspectors, in book form, enables them to conduct systematic examinations and to have their report on file with the Board of Health. Thus the city comes to know the history of each house, its observed defects at particular times and the remedies to be sought.

The school circular is alluded to in another connection. The circulars on drinking-water and its tests, and on cholera and disinfectants, have been widely distributed. The other circulars of the Board continue to be largely called for, and are found of great educational value to the citizens of the State.

THE NEW JERSEY SANITARY ASSOCIATION.

The New Jersey Sanitary Association continues its valuable aid in all that relates to the sanitary welfare of the State. It brings together many of the prominent workers in allied departments, such as civil engineers, chemists, teachers, health officers, etc., and enables them to become more familiar with the practical progress and needs of sanitary science and art. The one need of the State at present is efficient local health officers and Inspectors. Many of the local Boards are availing themselves of membership in this association, or send delegates, who

become informed as to various matters pertaining to their work. No Board in the State should be willing to be unrepresented. Health Inspectors and medical officers especially should not fail thus to become acquainted with each other's methods, and with the constant improvements being made in structural facilities, and in effective organization and administration. Brief and valuable extracts from their unpublished proceedings, and an outline of the work done, will be found in this report.

THE VENTILATION OF SEWERS AND HOUSE DRAINS.

BY RUDOLPH HERING, C. E.

One of the most important details which we are obliged to consider in a system of sewers and house drains is the question of ventilation. It is important because imperfect ventilation, or its entire absence, may not only impair the mechanical working of the process of sewage removal but permit the escape and discharge of sewer air at points where it might be highly dangerous to health.

In looking at sewers from the standpoint of ventilation, we may divide them into two general classes, namely, the ordinary kind, such as we have in our country, and the pneumatic systems; in other words, those which are open to the air, and others in which the air is constantly kept rarified by means of exhaust pumps.

In the latter, sewage is conveyed to the pump by atmospheric pressure, transmitted from the various inlets and receptacles in the houses. There is no tendency therefore in such a system for sewer air contained in the pipes to escape, but only for atmospheric air to be drawn into them and carried with the foul air to the exhaust pumps, where it may be passed through fires or otherwise properly disposed of.

In these systems the question of ventilation is at once settled and, as we must confess, in a most perfect manner. In fact, this simple and effective way of dealing with it forms one of the strongholds of the pneumatic systems, such as are proposed and built in some European cities by Liernur and Berlier. And were it not that other features make them, in all but rare cases, not only expensive but very troublesome, we should probably have little to bother us concerning the question we are discussing.

The method of sewerage which is employed in America, in England and in most cities of Continental Europe, is that of water-carriage, by

which the foul matters are suspended in water and propelled by gravity. It is nearly always the simplest, cleanest and least expensive one, and therefore bound to prevail. Whatever troubles it brings with it, such as, for instance, the proper disposition of the air in the pipes, they will have to be either mastered or, at least, sufficiently relieved to prevent dangerous effects.

It is the object of the following brief remarks to indicate the main principles of sewer ventilation, because it is found in practice that some of them are quite commonly misunderstood or not sufficiently appreciated.

The necessity for ventilating sewer pipes, such as we use, arises from the fact that conditions may exist within them, owing to a number of causes, that tend to break the water-seals or traps and thus permit the foul air to escape where it is intended to be held back.

It has been thought possible to solve the question by abandoning the water-seal and substituting a more powerful one. The idea was further encouraged by the announcement that a water-seal allowed gases to pass through it by absorption. In properly ventilated pipes the latter never occurs. But no substitute for water has been, and probably ever will be, found. Seals made by solid bodies are imperfect and liable to get out of order. Liquids alone can make a perfect one, as the passing sewage is found to carry along with it whatever liquid forms the trap, even when it is mercury, the heaviest of fluids; then, clearly, the only permanent material for the seal will be the water of the sewage itself, which can be and is constantly replenished.

I shall now indicate the various causes which tend to break the water-seals. It is not proper that we should include among them the evaporation of the traps. It is fair to assume that fixtures are used sufficiently often to be filled up long before the evaporation can destroy the seal. And, by being aware of this contingency, it is a simple matter, in case a house stands unoccupied for a season or longer, to allow water occasionally to run into all the receptacles in the building. The causes which are not so easily controlled are those which effect a *sudden* removal of the water, by exercising an unequal pressure upon the two sides of the trap, and these we shall now consider.

The air contained in the pipes is subjected to expansion and contraction by the hot and cold water discharged into them. One cause of unequal pressure inside and outside of the pipes is therefore to be found in a difference of temperature. If the pipe is open to the air,

this is very slight. Suppose the temperature of a house to be 50 degrees, and hot water is poured into a pipe so that its temperature for a height of 30 feet is raised to 122 degrees. The excess of pressure from 30 feet of cold air upon the outside leg of the trap against 30 feet of warm air on the inside, would cause a difference in the water-level about one-sixteenth of an inch.

But if the pipe is closed when the temperature is raised from 50 to 122 degrees, the increase of pressure, due to the expansion of the hot air, would equal the weight of a column of water 4 feet 8 inches high, which of course no ordinary trap can resist. The usual seal of 2 inches would be broken by an increase of temperature of about 2 degrees.

Further, the weight of the air in the pipe may become lighter by being saturated with moisture, while the atmosphere remains comparatively dry and therefore heavier. But this produces only an insignificant difference in the water-levels of a trap.

Another cause which affects the air pressure in the pipes is the wind. Suppose the sewer is entirely closed and that the wind blows steadily against the mouth at the outfall, until the same pressure exists throughout the system. If it blows with a velocity of 20 feet per second, the water-level in the traps would sink about an eighth of an inch. If it blows with a velocity of 40 feet per second, it would sink about $\frac{3}{8}$ of an inch; if 100 feet per second, about $2\frac{3}{4}$ inches. Therefore, as traps have a seal often as small as $1\frac{1}{2}$ inches, a very violent wind directed squarely against the outfall could blow them out, if they have no connection with the atmosphere by which to establish a relief of pressure.

The wind can also cause disturbances by blowing across the openings of vertical shafts or pipes. This action, as will be readily concluded from the foregoing remarks, while having a decided effect, yet cannot be sufficiently strong to endanger the traps. Its effect will be that of either exhausting or compressing the air in the pipes, according to the angle at which it strikes the opening.

Still another cause which tends to break the seals is the water falling in a vertical pipe or flowing in one that is nearly horizontal, and which will drag air with it by friction. The effect is the more powerful the more nearly full the pipe is running, and the consequence will be an exhaustion near one end and a compression near the other. This action is a very common cause of the siphonage of traps. The con-

ditions are so complex that a calculation of the effect is almost impossible. But we can obtain a good idea of it by imagining a body of water, completely filling the section of a vertical pipe, to fall from a fixture which is sealed by a trap. If no air can enter the pipe between the falling water and the seal, to fill the vacuum produced behind it, it is clear that the weight of the atmosphere will exercise its entire force to press the water from the trap into the pipe. This action can not take place if air is admitted just back of the seal. To guard against siphonage, otherwise than by this admission of air, many devices and patent anti-siphon traps have been brought into the market. It is not my purpose to describe any of them or state their relative efficiency. The best of them can be used to advantage in dwellings, under certain conditions, for small fixtures having large waste pipes. But none of them can make it safe to abandon a supply of air immediately at the sewer side of the traps in all the principal pipes which are likely to run full or nearly so.

Finally, another most powerful cause for disturbing the water-seal may be found in the varying quantities of sewage. Imagine a closed pipe to be empty, then suddenly an amount of water to enter it, filling it half full. The air contained in it will be compressed to one-half its bulk. As the pressure of air is inversely to the space occupied, it follows that unless the air can escape it would obtain an increase of pressure equal to one atmosphere, or the weight of a column of water thirty-three feet high. No traps, of course, could withstand such a force.

The necessity of having a communication between the pipes and the atmosphere is, therefore, apparent. Without it sewer air would constantly break through the weakest traps of the system, and carry the gases into the house, and even possibly from one house to another. It is clear, further, that communication with the air must also be had from points above the fixtures, to allow air to be drawn in when they are used. It will likewise be evident that there must be an opening at the lowest point of the pipe to allow air to escape when a flush of water is tending to compress the same before it.

These demands become the more urgent, the smaller the pipes are in proportion to the amount of water passing through them, as the variation of the air space is greater.

When it becomes imperative to have a direct communication between the atmosphere and sewer pipes at very many places, and as it is evident

that the escape of sewer air would be dangerous to the inhabitants, if foul and noxious, then sewer ventilation presents a second requirement, namely, that the air in the pipes should be rendered as innocuous as possible.

It is easier than might be imagined to accomplish a good deal in this direction.

The first condition is to prevent putrefaction within the sewers—in other words, instead of permitting deposits of solid matter and the stagnation of fluids, to arrange the designs so that from the moment it enters the system the sewage is kept moving until it is finally disposed of. This is accomplished by giving the flow a regular and a good velocity, and by avoiding all causes for eddies. A rapidly flowing stream, owing to its friction against the air, tends to prevent the latter from rising and dissipating its odor. It is a curious fact that a sluggish stream of foul-smelling sewage in a common ditch can apparently lose its odor when continuing its flow in a regular channel with a rapid velocity.

A second condition is the periodical cleaning of the sewer pipes, effected generally by a thorough flushing of water. A large amount of fine matter adheres to the sides, or some of it deposits along the bottom if the current is not swift. The scouring effect of a powerful rush of water generally carries it away without trouble. In houses where the pipes are small, a good flushing is obtained whenever the larger fixtures are used.

A third condition which is necessary to render the sewer air comparatively harmless, is the provision for a free circulation and a liberal admission of fresh air. Sewers in which these conditions have been secured are by no means foul or disagreeable to enter, and, if large enough, to pass through. The Paris sewers are visited regularly by strangers; in Hamburg and Frankfort they are so well built and maintained that they are frequently visited as models by those interested. The intercepting sewers of Boston are likewise kept in such condition that the air in them is quite good.

Circulation is produced by the following natural causes:

The difference of temperature between the inside of the pipes and the atmosphere, while it is too slight to force ordinary water-traps, as already shown, is an important factor in causing a movement or circulation of air. Suppose the difference in the case of a house pipe to be thirty-five degrees, and a shaft thirty feet high and four inches in

diameter, then the velocity of the air moving upwards would be about six inches per second. Suppose the difference between the air in a street sewer and the atmosphere to be eleven degrees, which is the mean difference for the winter in London, then the air would rise from the perforated manhole covers with a velocity of about two inches per second. In Munich, careful measurements were made by Messrs. Rozeahegy & Soyka of the circulation of air in sewer and house drains, and it was found that, generally in winter, when the outside air was colder, the currents were upward, and in summer, when it was warmer, the currents were downward, showing that the effect of temperature alone was sufficient to determine the direction. It is, moreover, the most constant cause for establishing circulation, as a difference of temperature almost always exists.

Another cause is the power of wind blowing into the outfall pipes. It has been found to be so great at times as to be a danger rather than a benefit, and it is usual to guard against this contingency. Still, use is made of the occasional air currents by allowing them to act on the ends of vertical shafts. That by this means strong draughts may be produced, needs no mention. The only disadvantage lies in their irregularity.

No perceptible air currents can be created in pipes by the varying barometric pressures of the atmosphere at different parts of a sewer system. The only effect due to this cause is to be found in a liberation of gases from the sewage in proportion as the pressure decreases.

The fact that an increase of humidity in the air decreases its weight, furnishes another factor inducing natural ventilation in sewers. The air in the latter is always moist. It is therefore evident that when the atmosphere is dry there will exist a tendency for the former to escape. When we consider, however, that the air of sewers varies in its composition—that it may at times contain more carbonic acid gas than the atmosphere, and, therefore, again increase its weight—when we further consider that the humidity of the atmosphere is not a constant quantity, we must conclude that this cause, as a means for sewer ventilation, is also insignificant.

The varying quantity of sewage in the pipes, again, is a prominent factor in exchanging the air contained in them, particularly in house pipes where the flow is more irregular than in a street sewer. If they are open to the atmosphere they will expel or draw in a quantity of air equal to the increased and decreased quantity of water flowing in them.

As air is moved and dragged along by friction with flowing water, we have finally another cause which tends to its constant exchange. The larger the sewer in proportion to the flow, the less will be the effect. In storm-water sewers we find, at ordinary times when they contain only sewage, that the effect is quite insignificant and more than balanced by other causes. During storms, however, when they are nearly full and the velocity of water is great, and also in small house pipes when the fixtures are emptied, the effect on the superincumbent air is considerable, as we have seen before.

From the above it will appear that there are numerous causes independent of each other which impel the air in sewers to move. Some act in one direction only, some at times in one and at times in the other, and when several causes occur simultaneously, they may together act in the same or in opposite directions. It also appears that seldom, if ever, a time will exist when there will not be some motion. Actual observation and experiments have amply demonstrated these facts.

As a difference of temperature is a great motive power, a number of suggestions have been brought out for using artificial heat to aid sewer ventilation. It may be well to refer to some of them briefly.

The ventilation of sewers has been thought to require a treatment similar to that of mines, and the means employed for the latter have been suggested for the former. Yet the two cannot be compared. Sewers are sealed throughout by water-traps, each having only a few inches depth, which, as we have seen, does not allow exposure to great variations of pressure; but in mines this condition does not occur, as it is possible to exhaust or compress the air in them to any degree. Consequently the schemes for drawing air into high shafts by special fires have proved a complete failure for common sewers. In order to reach any distance, the draught must be so great that no water-traps near the furnace can retain their seals against the suction. The fact that the cross-section of the mains is very much smaller than the combined sections of all their branches, being perhaps only 1-50th, makes it further evident that if the sewers were all tight and traps could not be drawn out, a velocity of twenty-five feet per second in the main would, on the above supposition, allow a velocity of only half a foot per second in the branches. As sewers are not air-tight, however, this amount would be much less. The great expense necessary to maintain such a draught needs no demonstration.

It has also been suggested that every lamp-post should be made to act as a ventilator, with the expectation that the heat of the flame will cause an upward current, and that a large number of small artificial draughts will accomplish what a few large ones could not do. Suppose the lamps were kept burning twenty-four hours, and that the cost of doing this was not objected to, it will be readily seen, after what has been said about the different causes for natural ventilation, that these flames could not prevent down currents, caused, for instance, by a lowering of the water surface. They would in this case even act as a hindrance to the otherwise more free circulation.

There are, of course, cases where artificial ventilation is effective and even necessary. The outfall sewer at Brighton, in England, which is five miles long and has no inlets along its line, is ventilated by a fire kept burning in a shaft, which produces a perceptible current several miles distant.

From the foregoing remarks we have seen, first, that it is necessary to have a communication between the pipes and the atmosphere, in order to maintain the seal of the traps, and to permit of a regular and undisturbed flow of sewage; and secondly, in order to have the air as pure as possible, that the sewers should not cause deposits and stagnation, but be provided with means for a liberal circulation and exchange of air. We have further seen what natural causes tend to produce circulation, that the difference of temperature within and without the pipes is the most constant one, and that artificial ventilation, on the whole, is less effective and very costly.

It remains, now, to point out by what arrangements and constructions a greater freedom of natural ventilation may be obtained.

Wherever it is not practicable to have a competent inspection and control over the house drainage on part of the municipality, it is best to disconnect it from the street sewers by means of a trap. In England and America this custom is followed almost exclusively. On the continent, such a separation is strongly opposed, the difficulty of control is not found to be so great, and the two systems are practically made into one. The advantage arising from this union is, the facility with which the street sewers can be ventilated to above the house-tops, particularly in winter, when the streets are covered with ice, and, also, the absence of fresh-air inlets, otherwise necessary at the foot of the house drain. As we, in this country, generally prefer to disconnect our dwellings from the street sewers than to run the slighest risk from

sewer air getting into the house, I will confine my remarks to this arrangement.

Free circulation in house pipes is obtained:

First. By carrying all the vertical soil and waste-pipes, full bore, to above the roof, so that the least possible resistance and the fullest exchange is secured. They can be carried up separately, or, to save expense, they may be united, where practicable, above the highest fixtures. In the latter case, the section of the combined pipe should correspond to the sum of the separate pipes.

Second. By providing an opening to the air from the main pipe, near its lower end, but on the house side of the trap, called a fresh-air inlet, because it usually operates in that way. When house drains are trapped against the street sewers, such an air-vent is absolutely necessary to produce circulation. Without it, they could no more be ventilated than a bottle being open only at the top. Usually, such an inlet is placed on the sidewalk, at the curb, and experience has shown that, when the system is otherwise properly arranged, no objection can be made. Where the sidewalks are very narrow, it is preferable to carry a vent-pipe to above the roof and thus secure, though less effectively, the desired circulation.

Third. To secure proper circulation it is evident that an unobstructed passage-way must exist from this inlet through all the vertical soil and waste pipes to beyond the roof, with neither traps nor abrupt bends on their course.

Fourth. To preserve the seal of traps that guard the fixtures, it is necessary to carry a vent-pipe from the sewer side of every one of them (unless an anti-siphon trap can be used) full bore, to the roof, either separately or united with another pipe above the highest fixture.

The upper end of the pipes should not be provided with any cowl or so-called ventilators, but left as they are. To attach any contrivance usually means to obstruct the exit of air. They may be carried up near or inside a chimney-shaft to secure additional heat, but it is not permissible to have any openings into the latter, because the changing currents might at times bring sewer air down the shaft into the house.

Rain-water pipes have been used for sewer vents, but very improperly, for two reasons. When they are most needed for this purpose, that is, when they are filling the sewers with rain-water, then they do not act because the falling water prevents a free escape of air.

And, as they terminate at the lowest point of a roof near or even below windows, an escape of gases from them might at times be noticed.

Herewith the essential principles are given for securing a thorough, a constant and a safe exchange of air within the house pipes. No odor is perceived from the pipes above the roof when thus treated, and none from the fresh-air inlets when properly placed.

The provision for the circulation through the street sewers and equalization of pressure, is obtained through shafts carried at frequent intervals up to the air. To leave a sewer for a long distance without such openings would, according to what has been said, be to endanger the existence of pressures, which, if there are any water-traps on the line, might destroy them, and it follows that the more frequently they are placed the better will be the exchange of air and the more thoroughly it will be diluted.

To prevent the escaping air from becoming objectionable, the following arrangements are used:

First. Special vent pipes are carried up to above the house-tops, or the house drains themselves are used for the purpose by omitting the main trap. The latter method has already been referred to as commonly used on the continent, and, as far as the street sewers are concerned, no better solution of the problem could be had. The former method, of course, answers the same purpose and is equally good, but the expense of extra shafts and the necessity of obtaining permission of house owners to attach them to the walls, has not favored its general introduction. When using either the house pipes or special stacks for ventilating the street sewers, it will be necessary to connect them with the latter at the top, so that by running full, the mouth of the vent pipes is not closed.

Second. Perforations are made in the covers for manholes, usually placed in the center of the street for the purpose of inspection and cleaning of sewers. In wide streets, and when the sewers are well built and kept clean, this method has been found to be entirely satisfactory. And under these conditions an odor is rarely observed as emanating from them, and then only in their immediate neighborhood. This method is, in fact, the usual one, and it is undoubtedly the simplest and cheapest. The perforations should be made as large as practicable, and arranged so that they will not clog up with dirt. It is also necessary to place a receptacle beneath to catch the matter which drops through and to prevent it from falling into the sewer.

In Northern climates, where the streets and, therefore, the manhole covers are liable to be covered sometime with ice, and, also in narrow streets where the escaping air will be too near the buildings, it does not answer to ventilate sewers in this way, and special pipes must be attached to the system and carried up to the tops of the buildings at the most convenient points, both to relieve the pressures and allow of ample circulation.

A number of expedients have been suggested to purify the air escaping from perforated manhole covers, in order to avoid the expense of high shafts. The best one was to pass it over and filter it through pieces of broken charcoal while ascending the shaft. The effect, however, was not satisfactory. The moisture in the air soon saturates the pores and makes the charcoal inactive, and the obstruction it necessarily gives to the passage of air impairs the circulation in the sewers.

In concluding my remarks I would say, that the question of ventilating sewers is not difficult of solution, as we have seen, when we base it on the supposition that a high dilution of sewer air by fresh air deprives it of the objectionable qualities. Whether this supposition is absolutely true or not, we do not know; but we have abundant evidence that it is true, at least to a very great degree, that, where the emanations from decomposing matter have been discharged into and mingled with vast currents of air constantly passing over our habitations, injurious results have never been observed. Until we are prepared to pay fabulous sums for passing all the foul air that is generated in the large centers of population, through fire or through some other destroying or purifying agent, no disposal is left but an extensive dispersion in the atmosphere. To show how this can be most effectively done at a reasonable cost has been the object of the above remarks.

HEATING AND VENTILATION OF DWELLINGS.

BY E. M. HUNT, M.D.

The heating and ventilation of dwellings becomes an important consideration for health, in a climate such as that of New Jersey. It will not be the aim of this article to treat of all that relates to the general subject. We desire to consider heating and ventilation as they are practically related to each other and how to secure the conditions of comfort and health as to each of these. While some consideration will be given to places of public assembly, we desire, chiefly, to inquire how the homes of the people shall be heated and ventilated.

The first division of the subject is into what are called natural and artificial systems. The truly natural system is where we depend upon the natural warmth of the body and the heat derived from the sun. Clothing and change of position are merely our methods of adapting ourselves to changes, and are found sufficiently available under various circumstances. While these can not be entirely depended upon, they are nevertheless to be emphasized. Those who build houses with a southern exposure, and with windows giving good access to light and heat, and yet interrupting draught, have practically carried out this idea. Clothing and proper changes of clothing and the use of such garments as can be easily put on or off at pleasure, are to be considered. It is fitly urged, that we may become too dependent on such forms of artificial heat as are furnished by fire.

It is always to be remembered that the body itself is a heat-producer, and that exercise and care of the skin and that proper quantities and kinds of food and sleep, have much to do with the generation and utilization of heat. We must not educate ourselves or our children to be more dependent on fire heat than is necessary. Those who too constantly hover around the stove, or who so receive heat as that one side of the body is overheated and another part exposed to cold or draft, are not enough impressed with the need of availing themselves of the

strictly natural sources of heat to a degree that shall limit our demand for purely artificial methods. Where the thermometer is at 70° F., and here and there a person feels too cool, there must be inquiry as to any improper source of draft, or else such person should have more clothing, more food or better health.

Our special need for special sources of heat arises from the variations of actual temperature, and from the necessity of surrounding ourselves with houses in which there are many artificial arrangements. Our special need of ventilation arises from the fact that the dust, gases, etc., incident to house-living, tend to deteriorate the air, and that we ourselves, in the process of life, are burning out or consuming the oxygen which it contains, as well as conveying to it decomposable or organic matter and noxious gases. The fires, the gas jets, and every thing that has breath and life within the house, tend to exhaust the air of its life-sustaining properties, while the myriads of floating particles load it with organic matter more or less unfriendly to vital purity.

The atmosphere provided for our use is composed of three gases—oxygen, nitrogen and carbonic dioxide, usually known as carbonic acid. With these the vapor of water is always associated. The first two are usually called essential elements, but water and carbonic dioxide are so far accessory, that air is never found, in nature, absolutely without them. The oxygen, nitrogen and carbonic acid form a simple mechanical mixture which is very perfect, although the same bulk of these gases has each a different weight. When thus mixed, the diffusion of gases is so perfect that they do not separate, except as they come in contact with some substance which will absorb or combine with some one of these constituents.

The usual proportion in which these normal components are found, is about as follows: Nitrogen, 79; oxygen, 20.96; carbonic acid, .04. There are slight variations, within a range which can not be said to affect human health. Ozone is oxygen in a peculiar state, but as it is not usually found in the air of dwellings, it need not be treated of here.

The active principle in the air, in its relation to breathing, is oxygen, so that any considerable variation from 20.96 per centum at once indicates deterioration. If the proportion comes to be as low as 20.60, it is to be regarded as bad. The quantity of nitrogen may become of undue proportion because of the diminution of the oxygen, but does

not by any actual excess become a danger to life. Carbonic acid, although always present as a normal constituent, is so only in very minute and evenly-sustained proportions where there is no peculiar artificial relation. This is shown by the fact that in outdoor life the millions of beings of all varieties do not, in their use and deterioration of the air, produce any sensible increase of it. It is only when we come to the artificial conditions of indoor life that we find any great change from the normal constituency of the atmosphere. This change chiefly consists in a decrease of oxygen and an increase of carbonic acid. The decrease of the former is more serious than the increase of the latter, and more serious as an evidence of the presence of organic material from the lungs and the body, than in itself considered. Pure carbonic acid may be present in the air to the amount of fifty or more parts in 10,000 without serious inconvenience, but if the carbonic acid present is the result of the burning out of the oxygen of the air, as in the process of breathing, the case is far different. Under usual circumstances, the amount of carbonic acid present has a double significance. It indicates to what degree there has been a diminution of the oxygen of the atmosphere breathed; and because the amount of organic or decayable material present in the expired air bears a pretty regular proportion to the amount of carbonic acid exhaled, it becomes a measure of this also.

When, therefore, we say that the amount of carbonic acid is beyond the usual amount, we indicate two other results which have taken place. When the normal amount of 4 in 10,000 is increased to 6 or 7, the air is apt to seem close to a person entering from the outer air. This will be a little modified by the condition of the person and the temperature of the air. A room is close or stifling when the amount is as high as 8 parts to 10,000. As good a test as any of this condition is the well-known lime-water test proposed by Dr. R. Angus Smith, which is thus given in our first report:

"Shake burnt lime in a bottle with water, and allow it to settle clear. (You thus have fresh lime-water.) Clean a very wide-mouthed bottle inside with a linen cloth, exhaust the air by suction through a tube, with great care not to breathe into the bottle, which would have to be cleaned again. Pour in one half-ounce of clear lime-water and shake well. If the air contains not more than the percentages of carbonic acid below, and the sized bottles there given are used, no turbidity will ensue from the carbonate of lime.

"Table to be used when the point of observation is 'No Precipitate':

20.63	oz., avoirdupois, bottle will have no precipitate if the carbonic acid is				0.039
15.60	"	"	"	if it is only	0.040
12.58	"	"	"	"	0.050
11.57	"	"	"	"	0.060
9.13	"	"	"	"	0.070
8.05	"	"	"	"	0.080
7.21	"	"	"	"	0.090
6.54	"	"	"	"	0.100
6.00	"	"	"	"	0.110
5.53	"	"	"	"	0.120
5.15	"	"	"	"	0.130
4.82	"	"	"	"	0.140
4.53	"	"	"	"	0.150
3.52	"	"	"	"	0.200
2.92	"	"	"	"	0.250
2.51	"	"	"	"	0.300
2.01	"	"	"	"	0.400
1.71	"	"	"	"	0.500
1.51	"	"	"	"	0.600
1.10	"	"	"	"	1.000

"In other words, as instances from our table, a bottle holding eight and a half ounces of air, with a half ounce of lime-water shaken in it, would show no precipitate or turbidity if the amount of carbonic acid was not more than .08, *i. e.* eight parts of carbonic acid in 10,000 of the air in the room and bottle.

"If a six-ounce bottle is used, with the same amount of lime-water, there might be .11 parts of carbonic acid to 10,000 of air, and yet there would be no turbidity; or if a two-ounce bottle was used there might be forty parts of carbonic acid to 10,000 of the air, and yet no turbidity ensue.

"Now, if a bottle of eight ounces, with a half ounce of clear lime-water, gives turbidity, you know that there is more carbonic acid in the air than is regarded as desirable for a school-room.

"If a six-ounce bottle, with a half ounce of lime-water, gives turbidity, you will know that there is more than eleven parts of carbonic acid to 10,000, which is an excess.

"If a two-ounce bottle should give turbidity, you then know that there are over forty parts of carbonic acid to 10,000, while there should be not much over eight parts to 10,000.

"By testing with different sized bottles, after you have once found turbidity, you will be able to find out nearly the proportion of carbonic acid."

The lime-water is prepared by dissolving a piece of common caustic lime, about the size of a black walnut, in a quart of water, and then allowing it to settle.

"The sensation of uneasiness produced by breathing impure air is an indication of the injurious effects that result from it, which is too often neglected. When the air is not sufficiently pure to effect the

complete decarbonization of the blood, we have already seen that the result is the circulation of venous blood through the brain; the respiration then becomes impeded, and the nervous system deranged; the extent of these effects, of course, varying with the amount of the exciting cause, and with the peculiar constitutions of the individuals exposed to their influence. Dr. Harwood remarks on this subject, 'The want of wholesome air, however, does not manifest itself on the system so unequivocally, or imperatively; no urgent sensation being produced, like that of hunger, and hence the greater danger of mistaking its indications. The effects of its absence are only slowly and insidiously produced; and thus, too frequently, are overlooked until the constitution is generally impaired, and the body equally enfeebled."

The amount of air-space needed by each individual depends primarily upon the amount of oxygen that is being burnt up or removed from the air of the room.

Our first data are derived from the amount of air consumed or deteriorated by each person. From 350 to 400 cubic feet of air passes through the lungs of a man of usual activity in the twenty-four hours. If every breath took out only a certain amount of air and its oxygen, and the expiration or outbreathing of the air from the lung did not return to the room, the problem would be a simple one, for new and pure air would take the place of the air extracted by breathing. But a cubic foot of air, as it comes from the lungs in ordinary respiration, has lost most of its oxygen, and contains, instead, upwards of seventy cubic inches of carbonic acid, besides organic matter and fouled watery vapor. This air has not only been devitalized, but infused with injurious particles. If there are fires or lights, every cubic foot of coal gas consumes the oxygen of ten cubic feet of air, and produces two cubic feet of carbonic acid. The combustion of a pound of oil consumes the oxygen of 130 cubic feet of air, and produces about twenty-one feet of carbonic acid.—*Huxley.*

While the latter is not laden like the breath with organic matter, it is a devitalization of the air. The need of air-space or ventilation also depends upon shape of room, height of ceiling, floor-space, etc.

With all these facts in view, those who have most carefully considered them, and have tested by experience also, claim that in a room ordinarily tight, 2,000 cubic feet of air must be admitted each hour for each person in it. This is based upon the conclusion that about 650 feet of air is actually needed each hour for each person, but that as practically we can not move the entire air of a room oftener than

three times an hour without draught, we must introduce three times the amount actually used up.

The amount of cubic space required may be stated as from 250 to 300 feet for dwellings, school-rooms, etc., while for tenements, hospitals, etc., it should be much more.

As height of ceiling over twelve feet is not counted, this would give to each person in a room, or to each scholar in a school, a floor-space of about four feet by five, or five by five.

It is well to consider all the various theoretic needs and modifications, because they help us to attain to accuracy. What is called experience needs to be tested by scientific facts, just as scientific facts need to be tested by experience. In this case, with the fact that there are so many modifications, and the additional fact that no room is dependent upon any one inlet, since windows, crevices and even bricks, admit much air, the statement of test most relied upon is that of Parkes and De Chaumont, which is, that the amount of air required for any occupied room is the amount needed to keep the room free from any perceptible odor to a person entering it from the outer air, and to keep the percentage of carbonic acid (carbon dioxide) as near as possible to the normal rates of four parts in 10,000, and never beyond seven parts in 10,000.

In heating a room, the problem with which we are chiefly concerned is, how so to heat it as to maintain a comfortable warmth and a purity of the atmosphere in accord with the conditions we have mentioned. While, technically, ventilation means to restore the air to its outside purity, this is never done; it practically means the keeping of impure air so diluted or mixed with pure air as to secure a standard compatible with health. Fortunately, within certain limits, there are powers of adjustment within the human organism which render it possible to be comfortable in, and not to be injured by, air which approaches to normal purity. But, if we go far beyond these bounds, there are embarrassing or destructive elements which are just as much a part of nature's law, and which cause a decided injury to health.

In the heating and ventilating of any room, the chief point of consideration is, how to warm a room and, at the same time, maintain a proper and uniform purity of air. This leads us to inquire:

(*a*) How to keep to a minimum the consumption of oxygen by lights, breathing, etc.

(*b*) How to get rid of all organic matter from the lungs, or from

other sources, which, in the form of decayable particles, contaminates, or is ready to contaminate, the air.

(c) How to prevent or get rid of dust and organic particles, which, if not putrescent, in a mechanical way interfere with the quality of the air.

(d) How to secure such moisture of the indoor air as is favorable to health and comfort.

As the outside air is, as a rule, purer than any inside air, the first question is, how to introduce this so as to avoid draught.

In order to make this a more single and simple question, we assume that the air will be heated after it has come into the room.

To such rooms fresh, unheated air must come in from without, and must come in at a slowness of velocity such as will not be so perceptible as to cause draught. This feeling of draught depends in part on the velocity of introduction, and, in part, on other conditions. "The warmth of the moving air influences the sensation of the persons exposed to it. At a temperature of 55° or 60°, a rate of 1½ feet per second (or about 1 mile per hour) is not perceived; a rate of 2 and 2½ feet per second (1.4 and 1.7 miles per hour) is imperceptible to some persons; 3 feet per second (2 miles per hour, nearly,) is perceptible to most; a rate of 3½ feet is perceived by all persons; any greater speed than this will give the sensation of draught, especially if the entering air be of a different temperature or moist. If the air be about 70° Fahr., a rather greater velocity is not perceived, while if it be still higher (80° or 90° Fahr.), the movement becomes again more perceptible. This is also the case with the temperature below 40° Fahr.

Our power of introducing air into a room without draught depends upon the size of the room, the number of persons to be supplied with air, the temperature of the air in the room and of that being introduced, the relative temperature of outside and inner and the mode of introduction. In a small room it is more difficult to have the air distributed before reaching the person, and so he may feel a draught. Where there are numbers of persons the air must be introduced more rapidly unless there is adaptation of size of room and modes of introduction thereto. We have already noted variations made by temperature and moisture. If the air comes in through some direct inlet, and nearly all at one or two points more, draught is likely to occur. Smallness of opening may give direction to the current, as where a hole

in a pane of glass directs a current upon some exposed part of a person near by, and causes a draught which a wide-open window would not. As a rule, we are not so likely to have draughts when the air is introduced at various points in small quantities instead of at two or three points in large quantities. We also do much to prevent the sensation of draught if we introduce it above the heads of persons occupying the room, and in such wise as to secure for it a a slight ascent. Thus, if the lower sash is raised and a tight-fitting strip of board is placed under it, the only inlet will be near the middle of the window, between the lower and the upper sash. The upper part of the lower sash serves to give to the air as it enters and gains a little heat, a slight upward motion. The direct current of the air is intercepted. It is also true that if a wire gauze is put in under a sash, or at the upper part, it cuts the air so as to diminish draught.

Another plan is so to introduce the fresh air from outside as that it shall become heated in the room, but before diffusion through it. Thus the draught is intercepted, and at the same time a proper temperature is imparted. One plan for doing this is illustrated in the *Galton* grate, where cold air from without is let in around the rear of the grate, and, being warmed, becomes diffused from the sides of the grate into the room. Another plan is, where a stove is surrounded by a metal case, or "jacketed," so that cold air is let in around the stove and, being heated, ascends above the jacket and is diffused in the room. School Circular XXVIII. (No. 2), page 10, illustrates this method. In each of these cases the air for the draught of the stove or grate is derived from the rooms, and so, to a degree, ventilates the room, while the air that moves about the stove, or grate, inside of the jacket, and so ascends and is diffused through the room, is fresh outside air.

For heating the air already within the room directly, we have the fire-place, the stove, steam or hot-air pipes and radiators. Of these, the fire-place and stove have directly to do with ventilation, as well as heating. We therefore speak of these here, leaving the others for after consideration.

THE FIRE-PLACE.

What even an ordinary stove will do thus to ventilate a room, in the process of heating, is well stated by Prof. Curtman, M.D., of St. Louis:

"Using an ordinary stove, and selecting as fuel anthracite, which contains about 98 per cent. of pure carbon, we find that for every pound of fuel burned, two and two-thirds pounds of oxygen, measuring about thirty-two cubic feet, are consumed. This corresponds to nearly 160 cubic feet of air. As much air escapes through the chimney unburnt, we need not wonder that Regnault's experiments led him to nearly double that amount, and assume that 312 cubic feet of air are required for every pound of anthracite burnt in a stove.

"A school-room twenty by thirty feet in extent, and twelve feet high, contains 7,200 cubic feet of air, weighing about 540 pounds. If during a cold winter day 300 pounds of coal are burnt in the stoves of this room, there will be (according to Regnault) 93,600 cubic feet of air, weighing over 7,000 pounds, passing through the stove into the chimney. In other words, by the mere automatic ventilation produced by the burning of the fuel, the room, containing 7,200 cubic feet of air, must be emptied and refilled thirteen times in a day; but as the period of active firing does not usually occupy more than nine hours (from 7 A. M. to 4 P. M.), the air is emptied and replaced about once in every forty minutes during school hours. Within these forty minutes, fifty children would inspire about 600 cubic feet of air, from which they would remove about six cubic feet of oxygen. The rate of ventilation in such a room, produced automatically by an ordinary stove consuming 300 pounds of coal, is therefore more than sufficient for even a greater number of occupants, and in warmer days, when only one-fourth of the fuel is consumed, ventilation will still be active enough for all purposes."

This, of course, would not be true, to the full extent, if the stove is air-tight, except at the point where air for draught is let in. But with this frequent aid, and with the fact that the stove door is often open, or the space not tight where the pipe enters the chimney, it does ventilate much. It is still truer of the open wood or grate fire, which is a great ventilator, and only a moderate heater. The objections to this method of heating are sometimes overstated, since, although too much heat is evolved at one point, and draughts made to the fireplace, which cause coolness at distant points, the air does not become stagnant in such rooms so soon as in those heated by pipes or radiators without artificial ventilation. An open fire, for slight heating and for great ventilating purposes, is often very useful in those forms of heating where hot-air or steam pipes, or radiators are used.

In houses which have no method of heating the air until it comes into the respective rooms, it is generally considered sufficient to rely for the supply of air to be warmed upon natural inlets, such as

crevices, windows, doors, the walls, etc., and all the more since the very warming of the air after it gets into the room is a mode of exhaust by which air is drawn into the room for the purpose of supplying the fire and to fill the vacuum which would otherwise be made. If the room is very nearly air-tight, and cold air is to be introduced for warming, the best plan would be "to admit the cold air through a number of minute holes spread over a large space in or near the ceiling." Thus air could be admitted at low velocity, which would gradually diffuse itself, and its entrance would be so high and so divided as not to cause draught. Where the air of a room is thus to be heated by heat-producing apparatus in the room, the heating is accomplished in all the three methods of radiation, conduction and convection.

Radiation is the giving off of rays of heat from a heated surface. The rays diverge in straight lines from every part of a heated surface, and from minute depths below the surface of hot bodies. The radiation may be increased by increase of the surface and by the nature of the surface. Radiation takes place in vacant space, that is, in space containing no form of matter which we can weigh, as well as in the midst of certain media called diathermanous. Air, glass and other bodies which may also in general freely allow light to pass through them, are examples of such bodies. In this form of diffusion the diathermanous matter is not heated, at least if it be perfectly diathermanous.

Conduction.—When heat is communicated from molecule to molecule of a body, while the molecules retain their relative places, the process is called conduction. This process is illustrated in the action of most solid bodies, especially the metals, when one portion of such bodies is raised in temperature above the other portions, by being brought in contact with a hot body. When one end of a poker is thrust into the fire, the temperature at the end is raised by the fire and the process of conduction is at once set up. The conducting power of different substances is very different. Thus, that of copper is 89.92, while that of iron is 37.43, and of zinc 36.30.

Convection.—In general when liquids are heated, the portions first heated become thereby expanded and so rendered specifically lighter than the remaining portions. Owing to the almost perfect freedom of motion among the particles of such bodies, the expanded portions are displaced upwards, while the heavier particles sink down to take

their places, and in turn to become heated and to rise in like manner. This process of heat diffusion is called convection.

If the heat for warming the air is to be generated in the room, it is very important that there shall be perfect combustion to an extent not to allow any gas to enter the room from the stove. This presupposes an adequate supply of air and a good draught of the smoke-pipe or chimney. Where the draught would be complete, the turning of dampers or the opening of the stove door even, while putting in the coal, may cause the presence of gas in the inbreathed air. A great deal of trouble with stoves and furnaces comes from imperfect draught of chimneys or from too small a supply of air to the coal. Supposing that a proper supply of fresh air is in some way reaching the room, and that the heating apparatus in the room is heating it, a question arises as to the *dryness of the air.* "One effect of heat upon air is to raise its point of saturation. One cubic foot of air, say at thirty-two degrees, is capable of containing a certain amount of moisture and no more. If we raise it, say to a heat near that of the human body it is capable of containing much more, and consequently absorbs moisture from every thing that contains any. The heating of the air does not dry it in the sense of extracting moisture from it; it only increases its capacity of containing water, thereby rendering it more absorbent or thirsty." Air suddenly heated thus appropriates to itself moisture that should be left for our use. We can somewhat limit the air from appropriating too much of the surrounding moisture if we provide for it an additional source of supply by warm water or an evaporating pan. Different states of atmosphere require different quantities. Professor Brackett clearly states the guiding principles in our sixth report, 1882, pp. 123–126. The nearest approximation stated, is that under usual circumstances, in rooms having stoves, the evaporation of half a pound of water an hour gives a moderately dry and healthy atmosphere. In the seventh report, 1883, pp. 21–26, a still further summary will be found. A sponge moistened from time to time, and kept hanging in front of a register, is often a source of comfort, because it aids partly as a filter to retain dust and is a source of moisture. Vessels of porous clay placed upon the register have also been used as a means of adding moisture. Another point bearing on modes of heating, is that made by Hood:

"There are always suspended in the air myriads of particles of animal and vegetable matter; but these almost unheeded atoms

possess a high philosophical importance, however they may generally be disregarded. Many of these particles are easily decomposed by heat, and are then resolved into the various gases, either in their elementary or mixed state. Hence many of the methods of producing artificial heat are materially affected, as regards their wholesomeness, by the fact of their being able or not able to decompose or chemically alter these floating particles of matter. To this cause is mainly attributable the unpleasant smell, produced by several modes of warming buildings, by highly-heated metallic surfaces; and we have already seen that the hygrometric and electric condition of the air is also altered by the same means. All the different descriptions of hot-air stoves are more or less liable to these objections; as also the high-pressure system of hot-water apparatus, and still more the cockle or hot-air furnaces. Dr. Nott's stoves, and also the Russian and German stoves, are subject to this inconvenience; and asphyxia is frequently produced in Russia by the use of these stoves. The cockle or hot-air furnace is particularly liable to these objections; for not only will it act powerfully in decomposing the floating particles of extraneous matter contained in the air, resolving them into sulphureted, phosphureted, and carbureted hydrogen, with various compounds of nitrogen and carbon, but it will likewise decompose a portion of the vapor contained in the air, absorbing the oxygen and liberating the hydrogen.

"Carbonic oxide is generated by all stoves which are constructed so as to burn with a very slow draught; and Dr. Arnott's stove has been found peculiarly liable to produce this deleterious gas, which escapes into the room through the ventilator in the ash-pit, and is extremely unwholesome in small close rooms. The carbureted hydrogen is abundantly produced by the gas stoves, in consequence of a portion of the gas escaping unburned from the stove; and this unburned gas, when combined with the large quantity of vapor which is produced by the combustion of carbureted hydrogen, as already described, renders these stoves peculiarly unwholesome. All these causes of deterioration of the air affect different persons in very different degrees; but wherever the causes exist, the result will necessarily be derangement of the animal system, however robust the persons may be who are exposed to their influence; but, of course, the sensations will be soonest experienced by the delicate and the valetudinarian."

The next question that arises is, how are we to provide outlet for the contaminated air of a room, so that fresh air is readily enough drawn in to mingle with the heated room air and keep it at a convenient standard of purity?

Too much importance has generally been attached to the fact that heated air, including carbonic acid, rises. Carbonic acid gas given off

from the lungs is rather more than thirty-seven per cent. heavier than the oxygen which is consumed. Also it is forgotten that the law of diffusion of gases is not governed by the specific gravity or temperature; that the mixing of air depends upon several circumstances, and that air laden with organic particles, even if warm, tends to cool as it reaches walls, and to flow down their surfaces and settle or find exit near the floor. The warmth of air from the lungs does not long counterbalance these facts. Where it is the air of the room that is being warmed by radiators, or coils, or pipes running about the lower part of the room, or by stoves or fire-places, the heat is produced chiefly in the lower part of the room and thus gets a force of ascension, while if there be no artificial means of ingress of fresh air, it will mostly come in at a level not higher than the doors of the room. The lower half of the room is thus the mixing chamber of the pure and impure air. The question whether we should trust for removal of impure air to the crevices, windows and doors by which pure air is drawn in, or to openings near the ceiling, will depend very much on the general tightness of the room and on the degree of heat maintained within it. A person skilled in the heating and ventilation of dwelling-houses would be much more able to tell how to do with a particular room than to give a general rule applicable to all living rooms. As a rule, an open fire-place in such a room, or a means by which air can enter, at the same height, a warmed flue of not less than five inches square, would be of service in the ventilation; also one or more similar openings into a warm flue a few inches from the ceiling, or, if there is a chandelier, a similar vent-pipe just above it, would aid in securing purity of air. These suggestions are based on the practical fact found to be true, that in such a room, or in a building thus dependent on natural ventilation and upon the heating of air after it is introduced, it is found that some days at some temperatures and with varying numbers in the house or room, the foul air flows out in greater quantity at the upper openings and in other cases at the lower. It is not very difficult to indicate the causes of the variations, but it is not always easy to adjust all the varying influences.

Next, we come to consider heating and ventilation in their relations, where the air that is to be used in a room for breathing purposes is brought to a proper temperature before its entrance. In very hot weather, this would presuppose the entrance of pure air from without into a cooling chamber. In other cases, it presupposes the

entrance of pure air from without into a heating chamber, where it can be raised to a temperature, which will be agreeable for its introduction into the building or room. The questions here are, how shall it be economically heated, so as not to add to, or, perhaps, so as to deprive it of all dust and other organic particles? How shall it be made to be not too thirsty for moisture (see p. 71), and how shall such uniformity of temperature be maintained as is desirable?

For the first-named purposes, various devices are used, from the elaborate filtering of the air, by revolving shafts of bagging and its spraying, as in the Houses of Parliament, to the simpler uses of sponge or cotton-batting filters and evaporating jars, as illustrated in various private houses. Also, as there is some difference in various forms of heating apparatus, as to the heat they cause and the degree to which they parch or dry the air, these are considered in determining preferences.

The modes of heating the outside air may be by stoves, as in the furnace or portable heater, or by steam or hot water or hot air passing over coils, or other radiating surfaces, in order to retain or multiply the heat; the object of all these being at the best economy of fuel, to provide a store-house of warm air, ready-made for introduction into rooms that need to be supplied with a good quality of pure, warmed air, for breathing purposes. Of all these, the one most difficult to manage satisfactorily is the furnace, as usually located in basements or cellars. First of all, the make of the furnace is too often such as to allow of escape of gas through its various joinings. The nearer it comes to being hermetically sealed at every joint, except where the air for draught is admitted, the better. The door or other place where coal is put in, often seems to diffuse gas and dust through the cellar air. While the door is open, combustion is very imperfect, and as the chilled coal comes in contact with the fire, gases are poured forth, to mingle with the air that goes into the apartments. If a large quantity of coal can be quickly put in, as in the gas-burning stove, it is much better. There should also be other ways of moderating the heat than by throwing open the furnace door. While filling is going on, all draughts should be turned on.

Second. The furnace is often too small for the result sought therefrom. The furnace is, therefore, raised to such a high heat as to loosen its joints, so that through these, and through defective spots in the castings, or even through thin wrought-iron, carbonic oxide and

sulphurous acid and other gases pour forth. The air also becomes superheated, or burned to a degree that no evaporating jar can compensate for. Persons breathing such air not only have it deprived of oxygen, but provided with various foul gases, and too thirsty for moisture. As a result, there is not merely a feeling of discomfort, by reason of the absence of some of the essential qualities of air, but dullness and headache, and irritation of the bronchi, from the carbonic oxide and sulphurous compounds, and an interference with the insensible perspiration. The furnace should be of such size that the air can be brought into apartments at a temperature not ever over 120°.

Third. The next error is as to the source of air-supply to the furnace. If this is directly from the cellar, it is not only mixed with the gases from the furnace itself, but with all foulness of air derived from anything in or about the cellar which can furnish gases or the organic particles of decay. Even if the cellar is well kept, its warmth, and the demand made on its air, starts currents of air toward it from adjacent ground, cesspools, broken joints of sewers, etc., so that these become unsuspected feeders. The air should, as a rule, be introduced from without through a pipe that, if underground in part, will not receive air from too near the ground, or near to any possible source of foul air, and that will not receive it from any such source along its pipe. The case, or jacket, around the furnace must be so tight-fitting that within it will only come the air that arrives through the air-box, leaving the outer air of the basement for the draught and combustion. It should be capable of some distribution and regulation, as winds, direction, and even concentration of the blast at one point, make important differences. Some encouraging attempts have been made to jacket furnaces so that thus the air shall be spread about the whole area of the furnace, and thus be directed through the pipes or registers. This aids, too, in mixing cool and hot air before it enters rooms. We need to study, in the setting and surrounding of the furnace, how this mixture can be best secured. The jacket plan is, thus far, the nearest approach thereto. If this mixture is properly secured, and the furnace of right capacity, and its radiating surface large in proportion to the size of the fire-box, we shall be generally able to regulate the warmth without closing the register and thus shutting off the supply of fresh warmed air.

Even where there is an outer air-supply, frequently a mingled supply or the chief supply, is drawn from the cellar; and so the cold-air

box is, in part, a deceit. This is prevented only by completely shutting out the furnace from the cellar by its cold case or jacket. Sometimes, in order for draught for the furnace, there should be another opening to the air connecting with the draught.

Fourth. Furnaces should be set with special reference to securing good draught, with flues as direct and smooth and vertical as possible, so as to avoid friction and secure an even current. In order for this, it is often better to have two furnaces rather than to choose a single point from which there has to be a winding distribution of hot-air pipes. The first requisite of a fire is, that it have a good supply of air for the draught. If not, combustion is imperfect. This means that, instead of the ultimate products of combustion, carried off by the pipes and chimney, there will be carbon oxide, unburnt carbon and hydrocarbons, poor in hydrogen, to mingle with the inbreathed air. The use of dampers and the shutting off of draught, while necessary, must be so regulated as not to give to the air these products of imperfect combustion. The hearth, or bottom of the furnace, must admit of free contact of the air with the fire. If there is too great draught, this prevents perfect oxidation, and entails loss of heat rather than foul air. Fire-place fires are expensive, because much air rushes out besides that which has aided in combustion, and because there is not presented a broad surface for the giving out of heat by radiation or by contact.

BOILER HEATING.

Leaving out the technical but important items as to plant, setting and expense, it can be said as to any form of heating dependent on a boiler, whether it be by hot air, hot water or steam, it is not difficult to introduce outside air by a fan or otherwise into a properly constructed room, where, by passing over and around adequate boilers, coils, radiators, etc., it may be brought up to and kept at a temperature fit to be let into rooms where people are to breathe and live. This mode is called indirect heating, as distinct from that method by which air is heated, as in the case of stoves or fire-places in a room, or from coil-pipes or radiators, which, being heated by heat produced outside of the room, nevertheless heats only the air in the rooms as it there passes over them. This latter we shall note more fully hereafter.

Having determined that air for breathing can be excellently pre-

pared before it is introduced into a room, the question of importance is, how to introduce it so as to secure from it an equable temperature, a proper admixture and such removal as is desirable after it has mixed with the air in the room and become charged with impurities.

"Until a few years since, it was taken as a matter of course, that, because heated air has a tendency to ascend, the aperture for its escape should be near the ceiling, and that the admission of the cold air should, on the contrary, be near the floor. This principle has been generally adopted in practice, with the disagreeable consequence of a cold draught along the floor. This notion concerning the ventilating currents is evidently due to a misconception concerning the motion of the heated air. The latter has, of itself, no tendency to ascend; but it rises, because, having increased in volume under the expanding influence of heat, it is pushed up by the denser surrounding air. Now, it is obvious, that the denser fluid will exert the same force upon the less dense wherever its inlet aperture may be situate. Consequently, a better position for this aperture is near the ceiling, because, when so situate, the incoming air gets diffused in the atmosphere of the room before reaching the persons in it. It is also equally obvious, that the heated air will be forced as freely out at the bottom of the room as at the top, if we only provide that it shall escape into *the atmosphere* at a height not below that at which the cold air enters. (See article Ventilation, Spon's Dic. of Engineering, page 3,024.)

It is also to be remembered that the greater specific gravity of the carbonic acid, as soon as cooled, and the presence of organic matter from the breath and from the person, as well as the tendency of air to cling to surfaces, tend to overcome ascent, so that, in many instances, the direction is changed.

Hence, General Morin and Huxley and various others maintain that the introduction of fresh air shall be near the ceiling, so as to avoid unpleasant currents, and that the discharge openings should be near the floor. Others claim that currents thus descend on the head, and that of the two, currents at the feet are more endurable.

But does the same principle apply in the case we are considering, where the air that is to be introduced is already warmed to a temperature more or less above that of the room?

It cannot, in this case, be urged as so important for the purpose of preventing currents and draughts, but there are other reasons that

seem to approve it in many rooms, and especially since the removal of the foul air at the bottom is desirable. Prof. Huxley puts it thus:

"If there is little or no interference with outside currents, the air within the building may readily be made to move in a body from above downward, and the rapidity of its movement can be easily regulated. It may be objected to this downward movement, that the natural tendency of impurities is upward with the course of the warmer air, and that, by being made to take a downward direction, they are brought back again to be re-inhaled. If it were true that the impurities as such immediately rose to the ceiling and escaped from the apartment, the objection would hold; but this is not the case. On the contrary, it is known that the carbonic acid and other gaseous impurities are equally diffused, and the weight of the organic substances and other suspended matters leads to the inference that they would gravitate toward the floor, particularly when rising currents of warm air are excluded, as they should be, by introducing it at the top of the room. In no other way can so steady and equable a movement be obtained as by introducing the warm air at the top, and removing it below; and apart from any theoretical considerations, it is found to yield excellent practical results."

This view, however, while in the main correct, does not decide that, with proper adjustment of inside arrangements and the introduction of warmed air, it may not be equally proper, in other cases, to introduce the air from below. Such a view of the best method has been stated by D. B. Dick, thus:

"Before we can arrive at a definite conclusion, we must consider what becomes of the cold air that will find its way in, in spite of our efforts to keep it out. Little streams of it will flow in under the doors, trickle down the face of the outside walls, and especially from the windows, also from all the chinks that ought to be air-tight, but are not. But, wherever they come from, they will all settle in a layer on the floor. The thermometer proves this, while our cold feet corroborate its evidence, and even the cat shows its knowledge of the fact by getting up on a chair to get out of it, or deserting her soft rug on the floor to sleep on the bare top of the kitchen table. Having found out where the cold air is, we must now ascertain what becomes of the heat evolved by the occupants of the room and lights. Assuming the desired temperature of the room to be as high as 70°, the temperature of the human body being 98°, and that of a flame very much higher, it is plain that these emanations, being given off at a higher temperature than that of the room, will ascend toward the ceiling. Lastly, we have to inquire what becomes of the watery vapor, laden with organic impurities, which is given off along with

the heat. Now, we know that the warmer air is the greater in its capacity for moisture. We also know that the air at the ceiling will be warmer than at the floor; therefore it will suck up this vapor away from the cooler air below. Now, with all these facts before us, there seems to be no possible doubt about the right positions of the inlets and outlet. The warm air, being admitted at the floor, will warm some of the cold air there, losing some of its own heat in doing so; then in its ascent to the ceiling it will carry with it the vitiated air and the watery vapor, with its organic impurities, and if the outlet is there at the ceiling it will sweep them both out of the room without giving them a chance to cool and fall down again among the pure air. We see also that, as the warm air begins to rise as soon as it enters the room, the more it is subdivided into a number of separate inlets the better, because it will ascend by the most direct course to the outlet, and, therefore, a number of small streams will move the general body of air in the room more effectually than one large one, and be less likely merely to pass through it. Although it is desirable that there should be a number of *separate inlets*, it is better to have only one outlet, because, if the suction should be greater in one than the other, it might draw against it, and then the flow of air would be from one outlet to the other, instead of from the inlets to the outlets."

As in many other cases, it is easy to announce the principle and easy after, for the architect and sanitary engineer to determine in any given house or room the method best adapted. But to give a rule or dicta, inflexible and applicable to all cases, is not so possible. So much depends on variations, most of which in this case are controllable, but some of which are difficult of control, that we must not too readily conclude that we can apply just the same method in each case.

Although the introduction of the fresh air above has often been successfully adopted, yet such success as that of the Grand Opera House at Vienna, and the Fifth Avenue Presbyterian Church of New York, show how the method of introduction of warmed pure air from below is successful. It is also admitted to be more economical. More depends upon the locality and number of the entering points, than upon proximity to floor or ceiling.

We abbreviate from the outline of Dr. Billings, the more recent views on this subject, and such as have been found to answer the tests made by instruments of precision and by practical experience:

"*First.* The register must be in such a position, and of such a size, that the requisite amount of air can be introduced through it without causing currents of air of such velocity as will cause discomfort to

the occupants of the room. The only difficulty in this respect, occurs in rooms occupied by a number of persons, such as assembly and school rooms, churches, theaters, hospitals, etc. Under such circumstances it is sometimes very difficult to so locate the FRESH-AIR registers that the currents therefrom will not be unpleasantly perceptible if they are rapid, and it then becomes necessary to make these registers of such an area that the velocity of the inflowing air need not exceed one and a half feet per second to secure the introduction of an amount sufficient for both warming and ventilation. When the registers are so situated that the currents from them will produce no discomfort they may be made smaller. For example, if it be determined to introduce the FRESH AIR directly through a perforated floor in an assembly room, the total area of openings should be at least one hundred square inches for each occupant, while the area of registers openings need not be more than forty square inches for each occupant if they are placed near the ceiling.

"*Second.* Taking it for granted that the FRESH AIR is to be warmed in cold weather before it is brought into the room, its registers must not be placed below the *foul-air* registers, unless the former are scattered all over the floor of the room. The reason for this is, that direct currents between the inflow and outflow registers are easily established when the latter are above the former, and in such case little change is effected in the great mass of the air in the room.

"*Third.* Flues of proper size cannot usually be placed in thin walls, such as ordinary interior partitions. A flue measuring less than five inches in its smallest diameter is of little use. Fortunately, in ordinary dwelling-houses, where this difficulty of thin partition walls is greatest, the precise location of FRESH and *foul-air* flues is of minor importance so long as the precaution advised in the preceding section be observed.

"*Fourth.* FRESH-AIR registers should not be placed in a floor so as to be flush with its surface, because dust and dirt will fall into the flues and be returned, to a certain extent, in the column of ascending air. Such registers are also a fruitful source of loss of small articles. It is always possible to continue the flue upward into a step or seat, and then place the register in the side of this.

"There is less objection to placing *foul-air* registers in the floor; but even this should be avoided, unless the openings are covered by some article of furniture, as, for instance, in a hospital ward, where a good position for the *foul-air* registers is in the floor beneath each bed; and even then the register should not be flush with the floor, but rise an inch or two above its surface.

"*Fifth.* In dwelling-houses and buildings of moderate size it is economical to centralize the heating apparatus as much as possible, keeping the FRESH-AIR flues in inner walls; but it is not easy by this method to secure sufficient warmth in the vicinity of windows, especially on the side most exposed to the winter winds.

"On the other hand, hot-air flues should not be placed in outer walls, unless these are thick and substantial, and even then it will be good economy to make the flue of terra cotta or galvanized iron, so set as to leave an air space of an inch or two on the outer side. For rooms on the floor immediately above the radiators, it is not necessary to place flues in the walls in order to bring the registers under or near the windows, which is their best place so far as heating is concerned. *Foul-air* flues should not be placed in outer walls, unless they are to be carried downward and to have some means of aspiration connected with them.

"*Sixth.* General Morin, and the majority of modern French engineers, advise that the place of introduction of fresh air shall be near the ceiling, in order to avoid unpleasant currents, while the discharge openings, on the contrary, should be near the floor. The introduction of warm air near the ceiling, in order to prevent disagreeable currents, is not absolutely essential, for such currents can be avoided, as above explained, by making the registers of proper size; and to secure comfort in cold weather, it is necessary, on this plan, that the air shall be introduced at a temperature several degrees higher than is required if it be admitted at a lower level.

"The proper position of the *foul-air* registers depends on the purpose of the room and on the season. During cold weather, in the majority of cases they should be near the level of the floor, to secure a satisfactory distribution of the air with the least expense. In large assembly halls, however, and especially where it is desired to provide for respiration, air as pure as possible, instead of *foul air* diluted to a certain standard, the discharge openings should be above.

"*Seventh.* In order to secure a thorough distribution of the incoming air, it is usually recommended that the discharge openings should be in the side of the room opposite to that in which the FRESH-AIR openings are placed, and as far as possible from them.

"In all dwelling-houses, however, and in rooms not having windows on opposite sides nor containing a sufficient number of occupants to exercise any special influence on the temperature, good ventilation will be secured by placing the fresh warm-air openings on an inner wall, and the discharge openings in the same wall at the same or a lower level. This is the arrangement in most dwellings heated by indirect radiation, the FRESH-AIR register being in the side of the chimney near the floor, and the *foul air* passing out through perforated fireboards on the same level a few feet away. The result is the establishment of a circulation from the FRESH-AIR opening upward and along the ceiling to the outer walls and windows, thence down the wall to the floor, and along the floor to the discharge.

"But when we come to deal with rooms having a large floor area in proportion to the height, and containing fifty or more persons, whose heat production is a factor that must be taken into consideration, there is some danger by this method that there will be an unsat-

isfactory distribution of the FRESH AIR when the temperature of the external air is not below 50° F."

The directions already given, as to filtering and moistening of air, will suffice, when this is necessary.

In comparing the methods of producing warm, fresh air outside of a room or house, there are various preferences. Those by steam or hot water or hot air, circulating in pipes as arranged outside the room, have various added appliances for securing heat and the flow of the air so as to be brought in contact with surfaces, ready to be distributed through openings, into the room. It is claimed that such heat is much more agreeable than that provided when hot air is produced by flowing along metallic heated surfaces, such as furnaces, stoves, etc.

Where the heated pipes or radiators are in the room, as in direct radiation, although the air heated is that of the room, none of the oxygen of the air is consumed in the process of heating, and such a mode of heating often gives quite a comfortable air for inbreathing. It is not the design of this article to establish the preference for this or that kind of method, so much as to plainly show what the different methods are, what are some of their advantages, as also what the errors or dangers are which are most likely to occur, and how they are to be diminished or avoided. Questions of expense, adaptations, etc., must be considered, and the method adopted be adapted to the locality and to the purpose sought. It must be said, in general, that the most perfect modes of heating and ventilation are expensive and, therefore, will not be chosen by those who are not impressed by the argument that the *best of air* for inbreathing is cheap, in the long reckoning, since invalidity and sickness are dear as well as uncomfortable.

HEATING AND VENTILATION OF SCHOOLS.

The principles already stated apply, with but little modification, to school-houses. Because the number assembled is often large, and because the scholars are not able to change position, if there is too much draught at one point and too much heat at another, there is every reason why pure air, sufficiently warm, should be so introduced as to secure an even temperature in all parts of the room, and such modes of escape of foul air be provided as shall keep the air-mixture uniform and sufficiently pure. The plans heretofore suggested apply,

but, as the number is large, every advantage should be taken of opportunities that favor the purification of the air.

As changes in classes and recesses give a chance for additional natural ventilation by means of doors and windows, these should be opened, if need be, at times when the pupils will not be exposed to draughts, or when there may be calisthenics. Yet, where there is a system of indirect heating, so that warm air is brought into the room, all these natural methods are apt to be an interference, and must be carefully regulated. As radiators or pipes in a room heat the air of a room without bringing in any heated fresh air, this system is the most hazardous unless accompanied with artificial methods of ventilation, and unless there is oversight by those who know how to adjust the heating and ventilation to each other. Janitors of schools, and of all assembly buildings, should be as particular to give thorough airing and flushing to rooms just after they have been occupied as they are to do it just before they begin to heat them for occupancy. It is this prompt cleansing and airing just after occupancy, and before any organic material has undergone change, that is most effective. Stoves, and registers admitting hot air, are, generally, not so well adapted to school and assembly-rooms as are other methods, by which the heat, at the time of production or entrance, is distributed through the room. While each school-building needs to be examined by some one acquainted with the laws of heating and ventilation and their practical application, the teacher or trustee who will carefully consider the principles herewith explained, will not fail in his own experience to gain some hints for his guidance. No system has yet been devised so perfect or automatic as not to require oversight, and much must depend on the judgment and regulation of those having charge of the building or the school. Further facts as to heating and ventilation will be found by references to the following articles: The Home and the School in their Relations to Health, pp. 42–85, First Report; p. 138, Second Report; pp. 20, 26 and 41, Seventh Report, and Circular XXVIII. of this Board.

ABSTRACTS FROM THE PAPERS AND DISCUSSIONS OF THE NEW JERSEY SANITARY ASSOCIATION.

BY D. C. ENGLISH, M.D.

NEW JERSEY SANITARY ASSOCIATION—SESSION OF 1884.

The tenth annual meeting of the New Jersey Sanitary Association convened in the Assembly Chamber of the State House, Trenton, on Thursday, December 4th, 1884, at 3:30 o'clock P.M.

Dr. J. W. Pinkham, of Montclair, read the first paper, on "The Sub-Surface Irrigation System of Sewage Disposal, as Illustrated in New Jersey."

Dr. Pinkham referred to other names by which this system is known, as the "Waring System," "Sub-Surface Irrigation System," and "Interrupted Downward Filtration System." (*See* p. 60, Seventh Report.)

After describing what the system is, he points out that it is necessary for the success of the system that the ground employed should be drained, either naturally or artificially, so that absorption will take place promptly, and that there should be a flush tank discharging its contents through an automatically-acting siphon. There should be such relation between the size of this flush tank and the soakage area that the whole system of pipes will be filled at one discharge of the tank, and such relation between the whole amount of sewage to be disposed of and the soakage area employed, that the liquid from one discharge of the tank will have become absorbed by the soil into which it is distributed before a second discharge. Then the nature of the soil must be taken into consideration. A clayey soil may be too retentive, and a soil composed mostly of sand may be too loose for the perfect working of this system; but as the area required is small, it would cost but little to add sufficient sand to the former and sufficient clay to the latter to render it suitable.

After referring to the absorption of the organic matter into the soil near the surface, and the change which it undergoes in coming in contact with the air and condensed oxygen contained in the porous soil, and that thus treated the organic matter is as much destroyed as if it were burnt, and the resultant products are as harmless as the products of wood and coal, Dr. Pinkham observes:

Theoretically this system is perfect, but the question, "Will it work?" is legitimate. The best answer to this question is the answer to the question, "Has it worked?" It has been tried for several years. It is important to know, not what a system will do under skillful management, but what will it do under the somewhat negligent management which it is likely to receive. To ascertain the opinions of those who had tried this system he had addressed circulars to about sixty persons who, for various lengths of time, had employed it, asking ten pertinent questions calculated to demonstrate whether it had been successful or not. Answers are given in the paper from about fifty to these several questions.

The Doctor, in closing his paper, makes the following summary of conclusions, which he thinks fairly deducible from the testimony thus given:

1. In Orange, Montclair, Caldwell and Dunellen, N. J., Goshen, N. Y., and Bryn Mawr, Pa., this system, constructed under the superintendence of Messrs. G. P. Olcott and James C. Bayles, of Orange, and Mr. James Owen, of Montclair, has, after, in many cases, prolonged trial, proved a success.

2. The first cost for a family and house of average size is about two hundred dollars.

3. The cost of annual maintenance is about ten dollars for such a house.

4. The ground selected should be free from shade and may be either lawn or garden.

5. By means of this system all liquid sewage from the smallest dwelling-house or the largest institution may be effectually disposed of without nuisance and without peril to health.

6. This system should take the place of cesspools in all suburban and country places which have sufficient ground for the distribution of pipes.

The paper was then discussed.

George P. Olcott, C.E., of Orange, said he had this small pipe system in use at his own home. Described its use at Dunellen. When the land was flat an artificial grade is necessary of 18 inches fall, and siphons used of from 11 inches up. Had seen some cases where it worked well without siphons, by allowing the liquid to dribble from the second tank, but in winter there would be danger of freezing. The best system has two tanks—the drainage led off from the second tank by lateral pipes of glazed tile, one foot long, with joints broken so as not to come too close together. Stoppage and disarrangement of this system, owing to carelessness in the house by servants, often occurs. He had seen a croquet ball taken from the house pipes. The solid matter which settles in first tank should be taken out and carted away at least every two months. He had adopted a plan of putting in two systems of lateral drainage pipes with a switch, and instructed the family to use each system alternately for about two weeks at a time. The soil over one system dries out while the other is in use. This system can be safely recommended where there is proper fall.

J. T. Hilton, C.E., Paterson, desired to know if some plan could be found to obviate obstructions.

Mr. Olcott replied that the caps could be taken off and frequent examinations made.

Rev. William Harris, Princeton, spoke of the disposition of house sewage along the sea shore. While often sewage in the soil is harmless, when it polluted the water it became a very serious matter. Can this system be used in the light, sandy soil along the sea shore? If sewage was run backward into the creeks, they soon become polluted and sources of disease. He had thought it might do to make a soil by ramming clay under the pipes, that would so far retard the drainage that the grass might take it up and prevent its affecting the water. He thought this a most important subject, in view of the possible invasion of cholera.

Mr. J. C. Pumpelly, Morristown, believed that great expense would have to be incurred to get the filtration necessary to take up the sewage.

Dr. E. M. Hunt, Trenton, thought this system not applicable where ready access was to be had to rivers or sewers. A strong argument against its general adoption is, that while it has been prominently before the public for the last nine or ten years, it had not been accepted as a substitute, but only as a modifying suggestion in other systems. It

did well in many places, but it was not, in his opinion, a perfect substitute for other systems.

Dr. Pinkham thought that the slow-progress argument had but little weight against the evidences of decided success recited in his paper.

James Owen, C.E., believed that the whole question of disposition of sewage from isolated houses was one that required as much care and watchfulness outside the house as inside.

Mr. Olcott thought there had been considerable progress made in the introduction of this system, when the adoption of it had increased in a few years from one to sixty.

Dr. T. W. Harvey, Orange, had the system in use in connection with his laundry. When put in at first the pipes were laid on hard pan. The result was the drainage from the pipes flowed over the surface of the ground. Then more pipes were put in to increase the discharge, and the hard pan was broken up. The system now works well.

Upon motion the general subject of sewage was then taken up for discussion.

Dr. Hunt spoke of the various and widely diverse opinions in regard to the disposal of sewage at the sea shore, which was now a very important matter to an immense number of people. The ocean, while handy and inviting as a receptacle, is liable to return it by the inflow of the tide. The same objection exists against leading it into our rivers, and he believed the time was rapidly coming when some rivers so used will reach a degree of pollution which will prevent the use of their waters for any domestic purposes. He believed that chemical processes are being found out whereby sewage can be satisfactorily disposed of. A plan was now being tried, with much success, whereby the sludge was solidified and so readily removed.

Mr. Owen was much interested because he lived in a town where they were debarred from a river exit for their sewage by the necessity of not polluting the Passaic. They must have some disposition of it otherwise than by the river. Some plan of solidifying at a reasonable cost seemed the most practical.

Mr. Pumpelly spoke of the trouble at Sheepshead Bay, which had been remedied by the Waring system.

Dr. Hunt was opposed to cities committing themselves to the purchase of patents. While we have engineers and chemists who are

able to give us relief, let us not put ourselves into the hands of companies who desire to sell their patents.

Dr. Henry Mitchell spoke of the difficulties met with at Asbury Park. Peculiarly situated as they were, the question of casting the sewage into the sea was an unsolved one, but now, after four years' trial, it was thought to be a success. All their sewage is strained by grates before passing into the street sewers, which lead to the sea. All the solid matter is collected into two pits, which are ventilated by stand-pipes extending about seventy-five feet above the surface. There is no odor whatever on the beach. Discoloration is seen on the shore at the sewer-pipe outlet, but only for a short distance out.

A member asked if it was true that the lake between Asbury Park and Ocean Grove had become so foul that they had been compelled to fill up a portion.

Dr. Mitchell replied, no; the lake was never in better condition than since the Board of Health took charge, and the negro settlement was cleared out from its head two years ago.

Uriah White, of Asbury Park, agreed with Dr. Mitchell, saying when the water is out of the lake, on account of an exceptionally low tide, you can smell the muck, but this has only occurred about once in three or four years. There is no sickness whatever on account of the lake.

E. G. Harrison, C. E., Key East, wanted to know the result of the small pipe system. In sewage we will have to follow nature. What we take from the soil we must put back, or else we violate the laws of nature. The Asbury Park system may now apparently work all right, but he had doubts of permanent good from any system which violated nature.

Hon. James Bishop described at length the system at Pullman, Illinois, whereby all sewage is collected in a receiving tank, whence it is pumped to a farm five miles distant, and there used for fertilizing purposes. This system is worked upon business principles, and, it was claimed, yielded a profit of six per cent. It is only about seven hours from the time the sewage leaves the house until it is distributed on the farm.

Dr. I. N. Quimby, Jersey City, had found very little sickness around the mouth of the large Jersey City sewer, which discharged on the flats. He is opposed to emptying sewage into streams, and thought there ought to be some decided expression of opinion which

will prevent cities from having sewage discharged into streams which may have to be used for domestic purposes.

Dr. D. Benjamin, Camden, desired to know what diseases were produced by bad smells. If a river is polluted, don't drink the water. "That is where the foolishness of the thing is, in using the polluted water." "There is in the city of Camden, owing to the arrangement of the water-supply, a continuous stream often flowing for about four or five hours each day between the bowels of typhoid fever patients in the hospitals and private houses and the mouths of the people."

Dr. Franklin Gauntt, of Burlington, delivered the annual address. Subject—"Preservation of Health by the Preservation of Water from Contamination." It was an able and interesting address, containing accounts of some interesting cases that had come under his own observation of water contamination.

The next subject presented was "Collective Methods of Water Supply of Towns and Cities."

Dr. E. M. Hunt, after expressing his regret that Col. J. W. Adams, C.E., of Brooklyn, who had been expected to read a paper on the subject, could not be present, spoke on the subject at the request of the Executive Council. He said that research goes to show that disease is, to a very great extent, the result of water contamination. When Prof. Murchison asserted that typhoid fever was generally the result of bad water, many were disposed to doubt him. That assertion has not only been proven, but also that typhoid microphytes are also conveyed through milk which has been contaminated in adulteration with bad water. Epidemics of scarlatina and diphtheria were also the result of contaminated water. He dwelt upon the importance of this subject, more so now than ever before, because the risks of contamination of pure water are increasing by its increased use in towns and cities, and because the sources of pollution are increasing through sewers, factories, heaps of refuse, &c. He dwelt on the evidences of evil results we have in general injury to health and specific contamination, as typhoid fever, cholera, &c. On the question of what to do, we have to decide in each case what constitutes the pollution. Water may be malodorous or unpleasant to the taste, and yet not be unhealthy. Again, water may be very clear and appear, on slight chemical examination, pure, and at the same time be very unhealthy. So we must

use all kinds of evidence, logical or natural, chemical, biological, clinical evidence, and evidence of general observation. The question how to prevent pollution or guard the water-supply, is the most important. There should be no wells in closely-built cities, and the whole matter of source, supply and distribution of water needed to be vigilantly looked after. He would emphasize the point, do not choose private corporations to introduce the water into our towns and cities, giving them full power. The Doctor closed with some practical remarks on the water-supply in connection with sewerage, referring, in illustration, to Philadelphia, Trenton, Newark, Salem, Gloucester, and the counties of Passaic, Essex and Hudson.

L. B. Ward, C.E., of Jersey City, spoke of the necessity of agitating the question of water-supply, as there are already 600,000 of the people of New Jersey living in towns and cities of over 5,000 population. He called attention to the fact that this State is wonderfully supplied with facilities for the best kind of water-supply for all its people, and yet we have localities suffering from a poor supply. He gave an interesting explanation of a large map, which was displayed, prepared by the New Jersey Water-Supply Commission, and which is described as a Contour Map of the Northern Division of the Passaic River Basin, including the Ramapo and Pequannock Water-Sheds; also, the district east of First Mountain, proposed to be supplied from these sources by a system of gravitation works and storage reservoirs. This supply is calculated to be capable of furnishing 480,000 persons, or 42 per cent. of the population of the State, with water.

In answer to a question of Dr. Benjamin, Mr. Ward stated that this water-shed has an area of 350 square miles, and can furnish 250,000,000 gallons per day, or 100 gallons for two and a half millions of people, which is about double the population of New Jersey. The area embraced by this source of supply takes in Hudson, Essex and Union counties, with the cities of Paterson and Passaic, making in all about 450,000 population.

Dr. Benjamin, of Camden, thought the Water-Supply Commission had done a grand work—very creditable to our State. This map shows how well this subject of water-supply can be managed, and how water-sheds can be utilized. We have here a correct and scientific method of supply. He thought there was the greatest necessity for the protection of the source of water-supply, and that the State should severely punish those who compel the people to use contaminated water.

Dr. Quimby, of Jersey City, also spoke of the need of legislation on this important matter, and thought the State should have control of these sources of water-supply.

Prof. A. R. Leeds, of Hoboken, doubted the practicability of special legislation for the protection of the sources of water-supply, and believed we had a remedy at common law. He cited a recent decision that the pollution of any stream used as a source of water-supply by any person, is a nuisance, and the person so polluting such stream is liable to prosecution. He thought it a very important decision.

The next subject was then announced by the President—"Experiments in Milk and Kerosene Testing, and in Analysis."

Prof. A. R. Leeds said he would confine his experiments and remarks to kerosene.

He spoke of the many accidents, of the tardiness of public opinion in securing protection to the people using kerosene from the cupidity of the seller, but at last we had been able to obtain laws upon this subject. He explained what was meant by the terms "standard," "flashing" and "burning" points, &c. Standard kerosene should not give off vapor at a less heat than 100° Fahrenheit. He then made several very interesting and instructive experiments, among others a specimen of dangerous oil which flashed at 91° instead of 100°.

Dr. William K. Newton, of Paterson, then took up the subject of the "Inspection of Milk," and described the methods used for determining its quality. The first examinations of the milk were by the sight, taste, smell, and by rubbing between the fingers to test the body. He then tried the several specimens before him with the lactometer. No pure milk falls below 1.029 at 60° Fahrenheit. He had tested 600 specimens and examined 6,500 cans of commercial milk during the last five years, and never found any pure below 1.029. Under the law of 1882 this test was sufficient, and the Inspector could destroy the milk. The law had now been altered so that the milk should be analyzed by one of the State chemists who knew nothing of its origin. No pure milk has less than three per cent. of fat. The first specimen examined had specific gravity of 1.031, and five and a half per cent. of fat, and so pure and very rich. He then explained the several different instruments for testing, which were present, and read the notes from 112 analyses of milk made in this State.

Dr. Quimby asked if the fat could be introduced into inferior milk.

Dr. Newton replied that it could be, but it was not likely the dealer would put in a more costly adulterant after reducing his milk. The present milk law was not a health law, but a commercial measure for the buyer's protection. Adulteration by chalk is a myth, because the chalk would not stay in solution. Soda and salicylic acid have been used for adulteration, and in one instance he found boracic acid, but the ordinary method of adulteration is to add water. He recited several instances of the pollution of milk from adding polluted water; one case where 120 cases of typhoid fever came from one cow-yard, where the cow-yard, pig-pen and privy were all on higher ground than the well which supplied the cows with water, and the discharges of typhoid fever cases were thrown into the privy and percolated through with other pollution into the well. Polluted milk is much more dangerous than polluted water.

The next subject was "Practical Teaching of Hygiene in Our Public Schools," by Prof. George H. Barton, Superintendent of Public Instruction, Jersey City.

The discussion on this paper was then opened by Prof. J. Madison Watson, of Elizabeth. He said that probably of all the questions that enter into our system of education there is not one of more importance than this. The crowded condition of our schools was of itself unhealthful, and therefore a practical knowledge of hygiene should be possessed by the teacher himself, that he may be able to avert trouble from this cause if for no other reason. A practical and theoretical knowledge of physiology and hygiene should be an essential part of the teacher's qualifications. No graduate of a normal school should be permitted to teach without a knowledge of these branches. Nine-tenths of the teachers in the United States are ignorant upon the subject of hygiene. He thought that there should be examinations of pupils as to their physical condition as well as mental attainments. While deprecating a too strict military discipline, he would still have a salutary observance of rules. Children cannot be orderly where there is not good health. Ventilation is of great importance. Exercise should be systematized and made regular; fitful exercise is injurious. The rush of the old-fashioned recess is injurious. Teachers in arranging their pupils for classification, should consider physical as well as mental strength. We should have our

legal committee procure legislation, making physical training (calisthenics) an essential part of our school system. Buildings that do not conform to the essentials of good hygienic school-rooms, should be abandoned, and in any district where these conditions are not complied with the public money should be withheld.

Superintendent J. A. Dix, of Elizabeth, thought that teachers generally felt the importance of the best hygienic condition in their schools. The trouble is more with those who have the control of the teachers. The trouble is with trustees and boards of education, and if money is to be expended in this direction it had better be appropriated for a normal school to educate these trustees and boards up to a knowledge of their duties.

State Supt. Apgar spoke of the importance of good ventilation. He thought the great difficulty was in carelessness and indifference more than lack of knowledge; the schools are no worse than our bed-rooms and public buildings generally. He thought there ought to be a rigid supervision of the hygienic condition of our schools by officers whose duties should require them to examine and report. Physical exercise, he believed, was very important. He visited one school where between five and six hundred young women, from fourteen to eighteen years of age, were attending, of whom not more than five per cent. had a good physique or were well developed, but had narrow chests and pale, pinched features. In another school fifty children were writing, most of them with their eyes about two inches, instead of twelve, from the paper.

Dr. Benjamin believed that the difficulty was with the school boards. Who is to exercise this strict supervision and enforce this accountability when the ward boss selects whom he pleases to run the schools, and puts them in or out of position as he pleases? We have the machinery for supervision in the State Superintendent and other superintendents. Children will not, of themselves, assume unnatural or uncomfortable positions. In school-rooms they are generally, however, seated with their faces towards the light, and they have to get down with their eyes close to their books or their writing, and shade their eyes with their brows, in order to see at all. In one room where I found the children with their faces to the light, I turned the desks all around and the result was that they all at once worked with their eyes three or four inches further away from their books. The light should fall on the page, and not on the pupil's face. In reference to

ventilation, it was not good policy to open windows for ventilation, because it made streaks of cold air in the room without purifying the whole atmosphere. The best plan is to bring the cold air in high up and have it heated by steam pipes and sent over the room warm.

Supt. Apgar did not want the impression to go forth that the school children in this State, as a general thing, faced the light. This had been remedied.

Prof. Watson said he had listened with great interest to the remarks of the State Superintendent, but he had not told us what to do with regard to hygienic and physical training.

Dr. Hunt said the subject before us is the teaching of hygiene in the public schools. We want to remember that the school children are to earn their living with their bodies, and that anything that tends to the devitalization of the child's body is an evil. The schools should be the teachers of the homes on hygiene. We need something to enforce practical instruction. We want normal school teachers taught that hygiene must have the same importance in the curriculum that is given to any other branch of study. I hope this Association will put itself upon record as insisting upon the knowledge and practical teaching of hygiene in the public schools. Let teachers, like physicians, come up and acknowledge their ignorance and manifest their willingness to learn.

Prof. H. B. Pierce, of New Brunswick.—If we send our legal committee to the Legislature for legislation on this subject, it will be told to go to the State Board of Health. Let teachers and parents and trustees be educated up to the importance of the teaching and practice of hygiene in the public schools, and there will be no trouble in getting all the legislation we want through the State Board of Health.

Rev. Mr. A. E. Ballard spoke in favor of the proper construction of school-buildings. It would not be a difficult matter to have the law compel the construction of school-buildings upon proper hygienic principles.

Rev. Mr. William Harris, of Princeton, believed that nine-tenths of the difficulty came from the cost and the want of sufficient appropriations. There is no system of heating and ventilation that does not cost in its introduction and all the way through. The Legislature must appropriate for the coal bill if they are asked to help in the matter.

The next subject in order was, "What should be done by Legislation or Municipal Regulation for Tenements and their Occupants, to Secure Proper Sanitary Condition?"

E. W. Harrison, C.E., of Jersey City, and Dr. E. H. Janes, Inspector of New York city Board of Health, both read excellent papers on the subject.

Dr. Janes' paper was published in full, by permission of the Executive Council, in the Report of the State Board of Health, 1885.

Dr. E. M. Hunt opened the discussion on these papers. He regarded both papers as very important; but did not think tenement population in Trenton could be restricted to the limits mentioned in Dr. Janes' paper. There is need, however, for the regulation of tenement-houses in a great many of our cities. There are many places where there is overcrowding and bad sanitary conditions, and unless something is done there will be plague spots in case of an epidemic. Attention cannot be given too early to procuring legislation in this regard. There was a law in Princeton that no student could board in any house that had not been examined and found to be in a good sanitary condition. He is in favor of rigid sanitary inspection, and held that it is needed just as much in Jersey City, Hoboken and Newark as it is in New York.

Dr. W. K. Newton, of Paterson, had been noting with great interest what is being done for tenement-house life in Great Britain, and particularly in London. The Peabody houses and some others of a similar kind have not benefited the class they were intended to reach, because they have been filled with middle class people, instead of the poor. In New York City the average of population is sixteen persons and a fraction to a house. In Brooklyn eleven and a half, in Newark seven, Jersey City eight, and in Camden five. There should be a law to prevent overcrowding. Paterson is the only city that has passed a tenement-house law and enforced it.

Prof. J. M. Watson offered the following resolution, which was adopted:

Resolved, That a special committee of three be appointed to take such action as may be deemed best to secure proper hygienic training in the public schools of the State, and to secure the essential instruction of prospective teachers.

"The Duty of the State and Local Authorities as to Cholera, and the Modes of its Prevention," was then discussed.

Dr. H. R. Baldwin, of New Brunswick, who had been appointed to open the discussion, presented seventeen propositions, which formed the basis of his remarks, and which were as follows:

1. Cholera is an infectious disease, having its origin in India, and existing in this country only as it has been imported.

2. Whilst cholera has broken out on shipboard in mid-ocean, it is only upon western-bound vessels that this has occurred.

3. The mode of importation may be directly by the individual—by baggage or other stuffs which may contain the germ—and which, passing quarantine, may become active after railroad transit of thousands of miles upon exposure to the requisite conditions.

4. The disease may spread through the atmosphere as an agent—through infected water or food, or from the dejecta of those affected.

5. That cholera appeared upon the Quarantine Station at Tompkinsville, Staten Island, once or twice during the year 1854 or 1855, and was so isolated that no other cases occurred. It was also at four several importations arrested at the lower quarantine during the year 1873.

6. That physicians in attendance upon cholera hospitals have frequently loose bowels and cramp in the legs whilst in such attendance.

7. That such a mild form of the affection may be capable of transmitting the disease, both through the breath and excretion.

8. That the recurrence of cholera within one or two years in the same localities may be due to the fact that the germ from non-disinfected stools having been deposited in the earth or privies, may have polluted drinking-water, and thus induced the attacks.

9. That in the face of the above propositions, the grand duty is an efficient and comprehensive quarantine.

10. That all local Boards of Health should use all means in their power to abate all filthy localities and sources of filth, so that no lodgment of cholera can be possible.

11. That municipalities and local Boards of Health should strictly watch all suspicious cases of diarrhea, and insist upon isolation, fumigation and disinfection.

12. That in the event of cholera appearing, all stools should be disinfected, all contaminated clothing put into boiling water or disinfected, or, if possible, burnt.

13. That the general use of public water-closets should be discouraged.

14. That scrupulous cleanliness should be the personal habit, and that drinking of water or taking of food, except of known purity, avoided.

15. That the water-supply, of every town not only, but in every household, should be carefully guarded against contamination.

16. That rules for the management of the stricken should be issued

by the State Board of Health, as well as a few short warnings as to how to avoid danger.

17. That moist and wet seasons or conditions are more favorable to spread of cholera than those freer from moisture.

Dr. Benjamin, of Camden, spoke of the impossibility of isolating cholera cases. Controlling cholera was like controlling fire—if it was taken at the start it could be put out. In England it had been demonstrated that sanitary cordons were useless. The only thing we can do is to endeavor, by vigilance, to secure the first cases and deal promptly with them.

Dr. Baldwin asked, if cholera has to run its course, how was it that the epidemic which broke out in New Orleans spread over sixteen States, and not over the rest of them?

Dr. Benjamin—I presume the conditions in the other States were not favorable.

Dr. E. M. Hunt spoke of the condition of feeling on the continent. While there was panic in France, there was the utmost sanitary vigilance in England, and the government felt satisfied that they should not have the cholera there. New Jersey is not likely to escape if the cholera gets into this country. One thing very much against us is the condition of affairs in Hudson county, where they have few facilities for taking care of cases of cholera. The only way to check the spread of cholera was in being ready for it. The historical data in India and elsewhere as quoted proved this. Speaking in reference to the importation of cholera, he was satisfied that there was far more danger from the luggage than from the passengers on board the ship.

Dr. Harvey, of Orange, spoke of the condition of his city; that the local Board of Health would be prepared to meet it if it came. They have power to erect a hospital, employ nurses, and to act at once in case of an emergency. He spoke of the importance of recognizing the first few cases. Prior to the general recognition of the presence of cholera in a city, the death returns will show a great increase of deaths from cholera morbus and diarrhea. The clinical features of such cases are not easily distinguishable from cholera.

Dr. William K. Newton read the instructions prepared for the government of the Sanitary Board of Paterson. He said that Paterson had on hand disinfectants ready for free distribution, and that cholera cases would be isolated in tenement-houses which would be taken for that purpose, or the cases would be isolated where they occurred, and

be provided with nurses and disinfectants. All clothing of deceased persons would be burned by a man already engaged for that purpose. In cases of death, the body would be wrapped in a sheet saturated with a solution of bichloride of mercury and buried.

Rev. Mr. Harris spoke of the unfavorable condition of the cities of Europe, and particularly of Paris. He also referred to the hillside holes in which the poor of Naples lived. He believed that, with fair hygienic care, we need not expect any such trouble as there has been with the epidemic in Europe,

President Gates said that very many were looking to this Association and expecting great things from their deliberations on this subject, and expected them to put the people of the State in the way of being ready to meet the cholera epidemic. Public attention may be concentrated upon the subject without necessarily causing panic. Information should, through our Health Boards, be given the widest possible publicity. Public attention should be called to the necessity of securing and preserving thorough cleanliness and the best possible sanitary condition in and about our homes.

Upon motion the resolutions of the committee were then taken up *seriatim*, and, after some slight amendments, were unanimously adopted, as follows:

WHEREAS, There is reason to apprehend that the cholera epidemic, which has recently made its appearance in Italy and France, may visit this country during the coming summer;

And whereas, Past experience has shown beyond question that the best and most effectual mode of dealing with this pestilence, as well as other epidemic diseases, is to prepare for its reception by thorough purification of all houses and premises, a complete removal of all filth or other material which might furnish a nest or breeding-place for such disease, as well as by a prompt recognition and fearless meeting of the epidemic at its first approach, and a thorough stamping out of the infection immediately upon its arrival; therefore,

Resolved, That, in the opinion of this Association, it is the imperative duty of the National and State Governments to adopt and enforce the strictest quarantine measures to prevent, if possible, the introduction of cholera into this country.

Resolved, That it is the duty of the State and local Boards of Health during the winter and early spring months to place every city, town and township within the State in the most favorable sanitary condition; that no place which might become a nidus or breeding-place for disease should be left uncleansed, and that all citizens should be urged

to co-operate by a thorough and systematic overhauling and disinfection of every part of their premises which might "furnish aid and comfort to the enemy." It is always wiser and more profitable to prevent disease than to be obliged to employ remedies for its cure; and time, labor and money promptly and judiciously expended in precautionary measures may save thousands of dollars and many valuable lives, when such measures would be too late to be of service.

Resolved, That we urge upon the State authorities the importance of such additional legislation as may be necessary to protect the health and lives of the people of our State, and the passage of such laws as may be required to hold health officers tò strict account for the faithful performance of their duties, and also such laws as shall secure to Health Boards sufficient funds to carry out health measures.

Resolved, That health officers should have police powers to enter into any house or upon any premises which is believed to be in an unsafe sanitary condition, to collect facts relating thereto, and, under direction of Boards of Health and with proper legal restrictions, should have full powers to summarily abate or cause to be abated any nuisance or cause of disease found within such house or upon such premises, and that such officers should be protected by the State and local authorities in the proper performance of their duties.

Resolved, That especial attention should be directed to the purity of water used for domestic purposes; that no water should be so used which is believed to be contaminated in the slightest degree by sewage or house-waste, and that in all cases where there is the least doubt the water should be boiled previously to its being used and cooled before drinking. It is believed that cholera is much more frequently introduced into the system by the fluids swallowed than by the air breathed. The addition of alcohol in any form does not render impure or unboiled water harmless.

Resolved, That in case cholera should find its way into our State, notwithstanding all efforts to prevent it, every case should be completely isolated and quarantined; all dejections from the sufferer should be thoroughly disinfected *before* being disposed of by burial; all clothing in contact with the patient should be destroyed by fire, and every precaution taken to prevent the spread of the disease. The passages from the cholera patient should be received in vessels or upon cloths, which have been previously prepared, and which should contain enough disinfecting material to effectually destroy the cholera germ immediately upon its leaving the body.

Resolved, That experience has shown that a large majority of persons suffering from cholera have been previously afflicted, for a period of from a few hours to several days, with a diarrhea, which may be slight or severe, but which is almost invariably painless, and that, in the event of an invasion of cholera, every person so afflicted with painless diarrhea, or other disorder of the stomach or intestines, should immediately consult a physician, without waiting for the

serious symptoms to develop themselves. In a large majority of cases, cholera can be easily and successfully treated, if attended to properly and without delay, in its earliest stages.

NEW JERSEY SANITARY ASSOCIATION—SESSION OF 1885.

The eleventh annual meeting of the New Jersey Sanitary Association was held in the Assembly Chamber, at the State House, Trenton, November 19th and 20th, 1885, the President, Robert Wescott, M.D., of Elizabeth, being in the chair.

Drs. Elmer, Shepherd and Warman, were the local committee.

Dr. Elmer, in behalf of the committee, made a neat address of welcome. He said that the meeting held in the House of Assembly was suggestive of the interest that the Legislature should take in the Association's work. It should pass laws to carry into effect the wise counsel given by the sanitarians.

President Wescott responded for the Association, whose appreciation of the cordial welcome extended he expressed. He said that the principal object of the Association was to maintain and improve the public health. He trusted that the good people of Trenton, as those of the State at large, would be benefited by these meetings, and that they, in common with the people of the State, would do all they could to further the interests of the Association.

A paper was then read on "House Drainage Requirements in Sanitary Codes," prepared by J. C. Bayles, M.E., of Orange. The latter being unable to be present, the paper was read by Dr. English, the Secretary of the Association. The paper insisted that what are generally called sanitary codes are apt to attempt to cover too much ground instead of being accurate and technical in their requirement. While they read very well on paper, they are too seldom fully enforced. We have an example of this in the New York plumbing specifications, as to which the inspectors are too careless in enforcement. Shrewd plumbers and architects well know how to cover up whatever they do not wish to be seen. Mr. Bayles contends that all pipes in buildings should be of iron, notwithstanding plausible reasons that are given for the use of earthen pipe, showing that in permanent structures the iron is less liable to get out of order. He chooses pipes of four-inch caliber, weighing three pounds to the foot, and laid with a fall not less than a quarter of an inch to a foot under

buildings. He claims that there should be no traps whatever in *main courses* of house sewer pipes, and even would dispense with the outside trap, his reason being that thus the flush is more effective and the ventilation better. To his mind, the risk from outside sewer gas, without traps, is not so great as of inside sewer gas with traps, which interfere both with flush and ventilation. In putting down the pipes, he would always allow two or three inches for wall settling, by spaces around the pipes where they pass through walls, and would have all joints fitted, filled and caulked with lead in the best manner. The code proposed is a simple one, and it is the general belief that it is to be commended to the attention of all city Boards of Health.

[The paper has been published in full in the *Iron Age*, of New York City.]

Mr. Bayles' paper was discussed by James Owen, C.E.; Mr. Bassett, Engineer of the Newark Board of Health; J. C. Pumpelly, of Morristown; Dr. Hunt, Dr. Newton and others.

The following points were brought out in this discussion;

The public should be educated to desire the best work, rather than the cheapest in plumbing; iron pipes, instead of earthen ones, should be used and with as few joints as possible; the dangers to health being not only from the house pipes but from the gas of sewers entering the house, secure traps should be insisted on; the trap should be outside the house; requirements in plumbing codes should embrace all important points; the plumber too often does his work from the monetary point of view; the Durham system had worked admirably in Morristown; the great difficulty of siphonage in traps was referred to and the Putnam trap, which is said to prevent it, was exhibited and explained; all plumbing requires constant inspection, especially where there is a running trap; Dr. Newton had never seen a tile drain properly laid, and so he insisted on iron pipe from the house to the sewer. There was an agreement with Mr. Bayles as to the necessity of not having traps on the main house lines but only under fixtures. Most, however, believed that sewers as a rule were not yet so perfectly ventilated as to make it safe to dispense with the outside trap between the house and the outside system of pipes.

Dr. Henry Mitchell, of Asbury Park, then read an able paper on "Methods of Sanitary Inspection of Houses and Premises and the Remedies for the Evils Disclosed."

He said that the title of the paper indicated one of the first steps to

be taken by local Boards of Health in their effort to secure healthful conditions. The time is not far distant when in this country the regular visits of the Sanitary Inspector will be welcomed and demanded by every intelligent physician. Dr. Mitchell described the accomplishments which a Sanitary Inspector should possess, and said that it was now a pressing duty to train men for this calling, for few persons are available for this occupation as a regular pursuit—such service not being yet sufficiently appreciated by city councils, etc., to receive the compensation it deserves, and therefore the men who are competent are unwilling to engage in the work, for they are generally already profitably employed. The experience during the past year of the district agents of the State Board of Health shows that the greatest weakness of local Boards of Health lies in the dearth of good Inspectors. The Legislature has provided authority for the expenditure necessary for the employment of Inspectors, but few local Boards yet realize the usefulness of these officers, and their judicious selection is perhaps scarcely to be expected under present methods. If the State Board of Health was given supervision over the appointment of all local Inspectors, having the right to reject any who were found to be incompetent, perhaps a step in advance would be taken.

Dr. Mitchell went into an elaborate description of methods of sanitary inspection, and afterwards the subject was discussed by Drs. Newton, Hunt and Davis, Civil Engineers Lowthorp, Wallace and Owen and others. The following were the main points of the discussion:

Health officers should be chosen by the State Board, as a competent health officer is rarely met with, the appointments being far too often made on political or personal preference rather than because of qualification for the position; the office of Sanitary Inspector is one of the greatest importance, and yet but few of the Inspectors are perfectly competent; the Newark plan was indorsed, where Inspectors are appointed after competitive examination: the cellars need more attention than any other part of the house; privies should not be allowed in basements without the greatest care in construction and constant inspection; we should also be careful in the use of cellar air in the heating apparatus of our houses; refrigerator waste discharges connected with the drain to sewers should never be allowed; the water used for drinking from wells should be carefully examined, and such

examination should be more thorough than the ordinary chemical examination, where sickness gives any occasion for suspicion.

In the evening the President delivered the annual address.

His subject was "Duties of Physicians as Sanitarians." It was an excellent presentation of the whole subject. After admitting that physicians are naturally drawn most into an inquiry as to the treatment of departures from health, the speaker showed why it had become an essential part even of practice that they should know the exciting and promoting causes of disease. Indeed it is now thus recognized by liberal-minded and well-educated members of the profession. Daily and in a practical way the physician can teach, and he should preach the gospel of cleanliness upon all proper occasions and he should not only practice what he preaches, but, if he has the courage of his convictions, he should endeavor to see that others do no wrong in this direction. He can show that cleanliness of person and surroundings is not only essential to physical health but is a very important factor in morals. He can show that neglect of sanitary laws frequently leads to neglect of moral laws; that perverted physical health often lays the foundation for mental and moral perversion; that filthy habitations and surroundings are antagonistic to purity of life; that human beings are largely creatures of habit and especially in childhood are imitative animals; and that people born, developed and in a certain way educated in squalor are almost certain to furnish by far the largest proportion of recruits for the criminal classes of society. He can show that while a few exceptional individuals rise out of and above such surroundings, a large majority never advance a step in the social scale, while many sink to the lowest depths of vice and crime. He can show the vast loss to the individual, to the family, to the community and to the State, in dollars and cents, caused by unnecessary sickness and death consequent upon unsanitary conditions. The death-rate in every part of the nation could certainly be reduced by efficient national, State and local sanitary supervision.

In the English official reports we find that such a system reduced the annual death-rate in England from 22.6 in 1872 to 18.9 in 1881, and that this reduction was not spasmodic nor due to exceptional causes, but was steadily continued year after year, and the reduction gradually accomplished during the ten years. In other words, 3.7 persons in every thousand were saved from death each year during the term mentioned, who would most certainly have died had it not

been for this careful sanitary oversight. While it is not claimed that the English system is perfect, this statement shows what has been accomplished there, and no reason exists why equal results may not be attained here. Coming nearer home, we can obtain useful information from the annual reports of New Jersey. No one who knows how much has been done and how much there still remains to do, will hesitate to testify to the great value of the work, and to urge upon every citizen the importance of a cordial support and assistance of the gentlemen composing the State and local Boards of Health. Taking our figures from the State reports for five years, from 1879 to 1883, inclusive, we find that 29,843 persons died in this State from causes which might have been avoided. Nor do we include consumption in this list, from which there were 15,077 deaths, because, while it is largely a foul-air disease, it is not yet recognized as being so often avoidable. This shows us that an average of 5,968 persons died in this State from preventable disease each year during that period, a large number of whom might have been living to-day if we had the proper laws and means to establish a sanitary oversight at all equal to that now in practical operation in England.

In estimating the loss to the State in consequence of unnecessary deaths, we must take into account the following items, viz.:

1. A sick person's productive capacity ceases during illness and convalescence, while those who die are permanently lost as producing members of the community.

2. For every one who dies, a large number are ill who recover. This is an important item, and the data are not as complete as could be desired, but we can obtain enough information for our purpose by seeking for it. The Registrar-General of England says: "We shall probably be well within the mark if we assume that for every fatal case of illness there are four or five cases which end in recovery. This is about the proportion in enteric fever, which is a more fatal disease than the average of diseases." It is evident that the Registrar-General is "well within the mark" here, and includes only serious cases of illness, which confine the patients to their beds for considerable time. And this view is confirmed by Dr. Sutherland, who said, in an address delivered at Glasgow, that he found by examining the reports of the Registrar-General for twenty years that the proportion of deaths to the number ill was in typhoid ten to one, and in typhus and diphtheria six to one, while the average illness of those who died

was in typhoid twenty days, typhus fourteen days, and diphtheria ten days; and the average illness of those who recovered was, in typhoid ninety days, typhus and diphtheria thirty days, thus showing that the direct loss of time during the illness of those who recovered was about three times as great as in the case of those who died. Upon this subject Dr. Playfair, a most careful and conscientious observer, says: "For one unnecessary death there are twenty-eight cases of unnecessary sickness, and in London there are yearly 10,000 untimely deaths, and 250,000 cases of unnecessary sickness." The statistics of friendly societies and insurance tables of England show similar results, while in this country those most competent to judge seem inclined to consider the calculation not far out of the way. It is safe to estimate that for one fatal case of illness there are four or five dangerously ill who recover, and from fifteen to twenty who are afflicted with comparatively slight ailments.

3. Every sick person during illness and convalescence requires the care of others as nurses, etc., thus preventing one or more persons from attending to the ordinary duties of life to a greater or less extent.

4. In case of death the time of a large number of persons is occupied with the final disposition of one who has permanently ceased to be a producing member of the community.

5. The productive powers of many persons are entirely suspended or partially obstructed by invalidism, more or less chronic, which is frequently so severe as to occupy the time and attention of others.

6. Illness and invalidism sometimes drag down individuals to such an extent as to render them incapable of caring for themselves, and they become charges upon relatives or friends, or upon the State as paupers or criminals, and, in some cases, as occupants of insane asylums.

7. It is generally admitted, by all who are familiar with social statistics, that every active individual of mature age and in good health is worth to the State, as a producer, $1,000.

After alluding to the many means for preventing the spread of contagions, the doctor says:

It is proper to call especial attention to one point which is sometimes carelessly guarded, and that is the make-believe disinfection that is frequently permitted. I refer to that sort of disinfection that does not disinfect; to that kind of protective display which is worse than useless, as it gives a false sense of security which is most dangerous.

Some time since I had occasion to speak to a physician in reference to the necessity of thorough disinfection in a case of scarlet fever, not only as important for the protection of others, but also as being beneficial to the patient, who was certainly injured by continued breathing of a poisoned atmosphere. I was assured it had all been attended to. When I had inquired in what way, I was informed that chloride of lime had been provided. Upon further inquiry I found that one pound of chloride of lime had done duty as a sort of apologetic disinfectant for nearly a week, and the box was not yet quite empty. What sort of child's play was that; and how could anybody be benefited or protected by such methods? And yet that physician stands well in the profession, and is a gentleman for whom, in other matters, I have much respect. Why if the germs of that disease were visible entities, and could appreciate a joke, we should be more likely to find that they had injured themselves laughing at such futile efforts for their suppression than as having been seriously affected by anything that well-meaning gentleman had done to destroy them.

In urging that the people must co-operate, the speaker added:

To do this effectually and intelligently they must be educated at least in the elementary principles affecting private and public sanitation, and, as previously stated, in this way the family physician can accomplish most useful results. When speaking on this subject Lord Derby, of England, said: "No sanitary improvements worth the name will be effective, whatever acts you pass, or whatever power you confer upon public officers, unless you create an intelligent interest in the matter among the people at large. The State may issue directions, municipal authorities may execute to the best of their power, inspectors may travel about, medical authorities may draw up reports, but you cannot make a population cleanly or healthy against their will, or without their intelligent co-operation."

Since Lord Derby expressed himself thus in England, the people there have advanced rapidly in sanitary education, and the results have been a very decided diminution in the rate of mortality. In this country our people are just fairly awakening to the importance of preventive methods, and the necessity of encouragement and co-operation in all reasonable efforts for improvement. Medical men should be—nay, they *must* be—amongst the leaders in this movement. The time is not far distant when it will be considered a disgrace to a physician not to be as thoroughly conversant with, and actively

interested in all matters essential to the prevention of disease as to its proper treatment. The people are rising to a higher plane in regard to their every-day life and its surroundings. They are beginning to expect, and in time they will demand, from those whose opportunities have enabled them to observe and study the conditions of their fellow-men, that they shall be among the leaders in this movement for the amelioration of the ills of life; and the time is not far distant when not only physicians but also law-makers and interpreters of the laws will understand (and they already begin to realize the fact) that the people require not only punishment of crime and cure of disease, but also, and primarily, the prevention of crime and disease. And they will insist on protection, not only of property and life from violence, but also all possible protection from the unseen, but none the less dangerous, causes of disease and death.

Great reforms have seldom paid in a money way or in popular appreciation in the beginning. They usually start slowly, hesitatingly, and advance with great difficulty. But if the reform is genuine and really needed, it goes moving onward, constantly increasing in volume and force. And this is the case with sanitary reform. It is not a new movement by any means, but it has, within the past few years, been making rapid advancement in this country, and its success means the prevention of a large percentage of unnecessary suffering and mortality, the prolongation of human life; making that life more useful, more active, more vigorous, more worth living. As each citizen helps to form the mass of people constituting the State, so by improving the individual we benefit the State in all its relations. Make individuals healthier, happier, cleaner, better in any way, physically, mentally or morally, and you inevitably elevate the State, and by beginning at the bottom raise the whole social structure to a higher, nobler, better standard. And it is safe to say that any movement which has such an object in view should receive, and will receive, the indorsement and hearty co-operation of every thinking, right feeling man and woman in the community.

[This address has been published in pamphlet form, at the request of the officers of the Association].

Speaker Armstrong, of the Assembly, being present, was invited to sit as a corresponding member.

Prof. James M. Green, of Long Branch, then presented the report of the committee on "School-House Inspection and Teaching of School Hygiene." Prof. Green prefaced the report with a suitable allusion to the death of Prof. George H. Barton, a member of the committee.

The following are extracts from the report:

It is a just cause for congratulation here, that the sentiment to which this Association is pledged—intelligent care for the health of the people—is spreading, and is reaching the guardians of the children. Everywhere there are signs of awakening. Our State Teachers' Association has taken up the subject, Monmouth County's Teachers' Institute has devoted a period to it, and institutes elsewhere are falling in line. "The morning cometh."

The first part of our subject we shall interpret to mean the securing of the proper sanitary conditions in our school-rooms.

Two of the greatest evils to be overcome, in the advancement of our cause, is the selection of improper sites for school-buildings, and the adoption of improper plans for said buildings.

It is not uncommon to find the rural school-building on a vacant piece of meadow-land, or on the springy ground at the foot of a hill, under the shade of the overhanging trees, with no system of drainage. The remedy lies in a proper supervision of the selection of a building site, and of the plans for a building. This supervision should be exercised by the State Superintendent of Public Instruction, aided by the County Superintendents.

There are, on an average, thirty new school-houses built per year; therefore, the task of supervising their structure, and the selection of their sites, would not be heavy.

The lot accepted, the plans for the building should be submitted to the office of the State Superintendent for inspection, either by the Superintendent or a competent architect under his direction, with reference to ornamentation; height of ceiling; cubic feet of air capacity provided per pupil; number, size and location of windows; placing of seats and blackboards with regard to the admission of light; location of heating apparatus; ventilators, both for pure and impure air; closets; wardrobes; the various grades, with reference to climbing stairs, etc.

The above conditions complied with, the proper care of the school-room is made easy.

A *sine qua non* to the proper care of a school-room is a proper

knowledge of sanitary conditions. This knowledge must be possessed by the teacher.

A circular containing the necessary criteria for the proper care of a school-room should be prepared by our State Board of Health, or some other competent authority, and become the property of every teacher in the State, and thereafter a knowledge of such criteria should be a requisite for any certificate of license to teach. I prefer a circular to a text-book. The text-books are good for theories, but experience shows that too often these theories lie dormant in the mind of their possessor. Besides it is not general information that is needed. That is abroad. What we want is explicit instruction and direction. For instance: on entering the school-room the teacher should not wait for the air to become impure before providing for its change, but he should see that provision is made for a constant ingress of at least thirty cubic feet of air per minute per pupil, and for the egress of a like amount. He should not place over-confidence in the artificial means of ventilation provided, but should supplement it with the windows and doors. Drafts should be avoided; in order to accomplish this it is necessary to study the air currents in the room. They should be tested by holding the handkerchief or a lighted candle near the floor, then the ceiling, at various parts of the room, also at the mouths of the various pure and foul-air ducts, to see if they are doing the desired work at that particular time. The thermometer should be consulted at the close of each period to see that the temperature of the room varies but little from 68° Fahr. The thermometer should be hung in different parts of the room, or, what is better, two or three thermometers should be used to see that the temperature of the room at the level of the pupils is even.

These, and various other detailed data as this, once fully in the hands of the teachers, and there is no class of persons on earth more conscientious or faithful than they would be in putting it to its best use. Add to this a proper knowledge of sanitary conditions on the part of the doctors who enter our homes and are consulted by our people and we would have a veritable sanitary millennium.

The way to teach school hygiene is to teach it. By this we mean, teach it as you would teach anything else. Enunciate the theory, then reduce it to practice.

We are not here to discourse on methods of teaching, but we will venture the assertion that any knowledge brought to the attention of

the pupil that is not required to be practiced till it becomes a very part of himself, is of little value. I am of the opinion that just here is the error in the teaching of physiology and hygiene in some of our higher institutions of learning. The information is rushed to the attention of the student in such quantities that his mental impressions are either not reproducible or lie in the chambers of the mind in such confused masses as never to come forth in systematic form.

The pupils should be taught the efficacy of cleanliness, and this should be supplemented by a wash-basin, brush, comb, towel, door-mats, blacking-brush. Lessons should be given on the teeth and their proper care, the eyes and how to use them, the lungs and their proper care. Under this heading should be taught the importance of ventilation in every way the subject can be made impressive.

Lessons should be given on the proper position in sitting or standing or walking. These lessons should be supplemented by calisthenics, such as marching and performing certain movements that call in play the different muscles, meanwhile naming these muscles. The games should be supervised. Behind the sports of the recess should be the directing though unseen hand of the teacher, suggesting amusements that, while they do not violate cleanliness or gentility, do stimulate to activity. Lessons should be given on the use and abuse of the digestive organs, how to eat, what to eat, and what not to eat.

Some of the circulars issued by the State Board of Health have been used as texts with excellent results in some of the classes of our schools. Much more than we have space to express can be done in this line. The text-book on physiology and hygiene has its place in our schools, usually found in our higher classes, but we wish to emphasize the fact that the kind of lessons to which we have referred should reach every pupil in the school, from the highest to the lowest.

In closing this report we wish to add that the key to the practice of sanitary measures lies in the dissemination of knowledge on the subject. The people will hasten to their practice, for the reward, like life, is sweet. In this dissemination of knowledge every available means should be used. The Board of Health is doing a good work. The circulars it is sending out, and the questions it is asking the teachers and the people, will set them to thinking. But there is no more available means for hastening this work than the use of the schools by the authorities in the manner above indicated. In this way all new buildings will be best cared for, and the simpler principles of sanitation

will come to be understood by every teacher in the State and taught to all the children in the schools, and the children will tell their parents.

The discussion of the report was opened by Prof. J. Madison Watson, of Elizabeth. He referred to the good work done by the State Board of Health in sending out blanks for reports in reference to the sanitary condition of the schools, and also to the State Superintendent for the interest he has taken in the matter. The site of lots for schools is very important. We ought to have model school buildings to answer perfect sanitary conditions. They should be constructed so that plenty of light is secured, blackboards and desks should be in good position for light, the ventilation should be as perfect as possible. In reference to the teaching of hygiene, anatomy and physiology he said they should be taught, but not as a mere theory. They should be taught practically, as well as giving the scholars drill and suitable exercises or physical training. He would also teach the effects of intoxicants, as the most practical of temperance methods, as well as a question of dietetics.

Hon. E. O. Chapman, State Superintendent, spoke of the necessity of sanitary inspection of our school-houses and premises. He had been astonished that parents would permit their children to be subjected to bad hygienic influences in some of our schools, such as they would not tolerate in their houses. There was too much of that conservatism which argues that what was good enough for our fathers and for us, is good enough for the children to-day. He was glad of the decided progress that has been made during the past few years. Our buildings are much better than formerly, especially in their sanitary conditions, and the public are slowly becoming more interested in these matters. Our teachers are being taught the laws of health. Every pupil in our Normal School is now to receive one year's instruction in the laws of health, so as to give them to understand how to care for the health of the children who will be placed under their care. The State Department should probably have more supervision of the schools in our cities; especially should the building sites and buildings be approved by the State Department. In correcting bad sanitary conditions he had noticed one thing, that the sending out of the blanks for reports had done much good; in some instances the evil was corrected before the report was sent in. An expert examination, he thought, should be made of all our school-houses.

Mr. T. H. McCann, C.E., of Hoboken, spoke of the importance of the thorough inspection of schools, especially in our cities, because they were more crowded than in the country and small towns. The need was in many places the greater because of the incompetence of trustees or boards in matters pertaining to sanitation.

Prof. Green said that many teachers were thoroughly instructed in the theory of physiology and of hygiene, but what they needed was a clear detailed circular from our State Board of Health, giving hints as to the practical ways of applying the knowledge they have acquired from books, also how to ventilate the school-room. Then we need authority in supervision that will compel incompetent local trustees or boards to comply with hygienic or sanitary laws or requirements.

James Owen, C.E., heartily indorsed supervision, by the State Department of Education, in the construction of school-houses. He thought the subject of ventilation one on which we are in great need of information.

Prof. Watson thought that the local Inspector should inspect the school building once a month, and he thought we should have laws requiring the inspection of private as well as of public schools.

Dr. I. P. Davis thought the people had too much confidence in the sanitary skill of the teachers, and, consequently, did not, as they should, investigate as to the sanitary surroundings of the schools their children attended.

Dr. Newton said that Paterson was short of school accommodation for at least 1,000 of her children. They had but $15,000 to spend for buildings, and so had to economize in their construction. The money consideration became thus more important than sanitary requirements with the school authorities, and so you will hear it said "Let us cut out the ventilation, that will save so much." He thought in teaching hygiene we needed, more than anything else, a good text-book on personal care of health. One of the best books he had seen was "Parkes' Personal Care of Health."

C. P. Bassett, C.E., did not think that the people were alive to the importance of this subject. In reference to ventilation, professional advice from competent experts is needed. He gave some amusing incidents of ill-advised attempts in ventilating school-houses.

At the opening of the morning session F. C. Lowthorp occupied a few minutes in speaking on the use of earth-closets instead of ordinary

water-closets. He showed a plan of such a closet, and alluded to the satisfactory use of them for several years past.

Dr. Joseph H. Raymond, of Brooklyn, delivered an interesting address on "The Collection and Removal of Garbage, and the Final Disposition to be made of it."

The speaker said that unless it was disposed of it would find its way to cellars, back yards or vacant lots. As to the method of its disposition, the subject was divided under four heads:

1. Removal to sea and its deposit there.
2. Removal by land or water and fed to animals.
3. Removal to a proper place and burned.
4. Disposition of the garbage within the house of the individual.

We must adopt one of the four plans, or a combination of them. The action taken will depend upon the kind of a town or place it is—whether a seaport or inland town—and also upon the amount of the appropriation for the purpose.

In speaking of the removal from the house, Dr. Raymond said that the nuisances connected with the retention of garbage are due to the sort of receptacle used. He thought that the only proper vessel for such use is a galvanized iron pail, furnished with a tight cover. It is a matter of importance whether a proper vessel is provided or not. With ordinary vessels we have within a very few hours after the collection of the garbage, offensive odors. This is especially the case in the summer season. The iron pails can be kept anywhere in the house, being perfectly tight. The removal must be by either the municipality itself or by a contractor. The work of the latter is not at all satisfactory. He has no idea of the sanitary difficulties in the way. It never occurs to him that he has an interest in the public health. He looks, perhaps, strictly to the performance of the terms of his contract, but he exercises no discretion, and there is much about his proceedings to find fault with. It is essential that the municipality should do the work, and that a proper method be devised for doing it. Dr. Raymond referred to the excellent plan in vogue in Boston, where the men are carefully selected. Then they are kept in their positions, and look upon it as a life business, some having been employed twenty or thirty years. Of course politics did not, and should not, enter into the matter of appointments.

Having the right men, the question to consider next is the outfit or plant. The speaker said his own preference was the employment of

barrels placed on wagons. The wagon plan without barrels is expensive. Such vehicles are made of seasoned material, and perfectly tight, and cost about $250 apiece. The barrel plan is inexpensive. Ordinary kerosene oil barrels will answer. They can be purchased and rendered serviceable for about $2.50 each, and six or eight of them will do the work of a cart. The barrel system has many advantages over the other. If a wagon leaks, the trouble cannot be remedied until the wagon has arrived at its destination. If barrels are used and they leak, the garbage can be instantly transferred to other barrels. In filling wagons the bulk of the waste is exposed; in filling barrels but little need be exposed, and the nuisance ordinarily created is reduced to a minimum. And still another advantage of the barrel plan is, that they can be readily handled. Referring to the method of removing garbage by sea, Dr. Raymond said the greatest difficulty has been to keep garbage intact on the vessel until the dumping ground was reached. The garbage, owing to the shallowness of the boats, drops into the water and floats back upon the shores. New York, Brooklyn and Boston have now deep boats, and the trouble in question has ceased. This form of boat, known as the "Barney boat," dumps from the bottom.

The plan of removing garbage by boats, cars or wagons, to a place where it can be fed to animals, has this advantage—that there is a return in money for the garbage, which assists in paying for the expense of its collection. This system obtains in Boston, where they get enough money to pay about one-half the expense. Farmers buy the refuse and feed it to animals. Dr. Raymond explained that he did not mean ruminating animals. Such animals so fed have white meat, which looks very nice, but it is watery and innutritious. Pigs alone should be fed garbage. It makes excellent pork. The speaker said he believed that a city having the proper facilities could, by this plan, in a few years manage to derive a sufficiently large revenue to pay the whole expense of collecting the garbage.

The speaker, referring to the plan of cremating the garbage by cities, said that no machine to carry out this idea had yet been invented. The great cities of the country were waiting for such a machine.

Under the head of "Disposition of the Garbage within the House by Burning," Dr. Raymond said that this was the custom at his own home, and in those of many others. Potato peelings, &c., are thrown into the range and quickly consumed. The question is, whether it is

a practical thing for cities and towns without strict official supervision. As in Brooklyn he knew of at least a thousand persons who cremated their garbage, he concluded that it was a feasible plan for cities.

Several members availed themselves of the opportunity to ask questions, and in reply Dr. Raymond stated:

There are patent garbage burners, some of which are very good, [specifying some of them.] In reference to mixing of garbage with ashes there is no satisfactory methods for removal. They are too apt to deposit it on vacant lots. In reference to bones and entrails of fowls, he always burned them as other garbage. Watermelon and other rinds are difficult to get rid of, but the garbage burner placed over the fire is the best he knew of. The floating back on the surface of the water of garbage thrown into the sea, had formerly been much complained of in New York and Brooklyn, but since the Barney dumping boat had been used there had been very little complaint.

Dr. Raymond's remarks provoked a very interesting discussion of the whole subject, in which Drs. Godfrey, Davis, Quimby, Hunt and Benjamin, as well as Rev. Mr. Ballard and Engineers Owen and Bassett, took part.

Dr. E. L. B. Godfrey, of Camden, who opened the discussion on the address, thought that Dr. Raymond's address had been so able and exhaustive that he need say but little. He thought that the great trouble in our State was that the removal of garbage was done more from the financial than the sanitary point of view. Tight garbage cans should be used and the garbage so collected should be removed in summer every day or two, at other times once or twice a week. He regarded the deposit of garbage on vacant lots as exceedingly reprehensible, on account of the disease arising in the neighborhood where it was so deposited. Burning, in his opinion, was the only true and safe way of finally disposing of garbage.

Dr. Hunt thought that Dr. Raymond had admirably presented the subject. He thought there should be some method of preventing the mixing of garbage and ashes. The authorities should refuse to remove it when so mixed. He spoke of the method of burning, as he had seen it in operation abroad. In Glasgow, especially, it was entirely successful, being first assorted; bottles, rubbers, &c., are first taken out, the remainder burned in their crematories.

Dr. Benjamin asked, what objection can there be to the use of garbage for fertilizing purposes? The assorters are exposed to the deleter-

ious influences of garbage, and yet did not seem to suffer seriously from the exposure. He had seen bad effects of cattle feeding on garbage; it had occasioned disease through the milk-supply.

Rev. Mr. Ballard said they had tried in Ocean Grove the plan of having farmers remove the garbage, but it was carelessly done. They came for it when it suited their convenience. He knew of one case where 200 pigs died as the result of feeding on garbage.

Dr. Davis spoke of his experience in feeding pigs on the garbage of his house. He thus got rid of the garbage and pigs seemed to thrive upon it.

Dr. Raymond strongly advised that garbage in cities should be removed three times a week regularly, the year round, if kept in safely-covered vessels. It keeps up the system of regularity in removal.

The reports of the State and local Boards of Health were next received.

Dr. Hunt, speaking for the State Board, said that the last year was one of the most successful in its history. Great progress had been made in sanitary science and legislation, and the powers of the Boards had been extended to such a degree that under them many reforms are being effected. In cases where the powers of Boards to abate nuisances, etc., have been questioned, the courts have rendered decisions in their favor. These decisions have done much to create public sentiment in favor of the work. He briefly alluded to the methods of work pursued by the State Board, and illustrated instances where great good had been accomplished. He praised particularly the inspection law, which authorizes the appointment of Sanitary Inspectors in all towns of over 2,000 inhabitants. Many Inspectors have already been appointed and are doing good work. The Board has felt the importance of the inspection of schools, houses and premises, and blanks, with instructions as to methods of inspection, issued by the Board, had already done much good. He spoke also of progress made in the prevention of disease, and also in the arrest of its spread.

Dr. Benjamin, of Camden, reported decided improvement in the efficiency of their Board of Health, recently re-organized under the State laws. Improvement in the water-supply is greatly needed. Garbage is better cared for. The appointment of the present Sanitary Inspector was a good one, and promises good results.

Mr. Williams, Cape May City, reported progress in the rules and measures adopted. The burning of garbage had not worked well with them; opposition has been aroused by the stench arising from the burning. Hence the question as to the disposal of garbage was with them an important one. The piggeries where it had been used had become a nuisance, and so they had to go.

Dr. McCrea, Inspector for Cape May county, reported every district in the county has now a Board of Health.

Dr. Wallace, of Newark, reported very decided progress in that city; several ordinances have been passed which have made important changes, and their enforcement promises great improvement in the sanitary condition of Newark. The death-rate was 26.21, which was exceedingly high, and demonstrated the need of an efficient Board of Health. He spoke of the tenement-houses and the large number of persons crowded in some of them.

Dr. Hunt called attention to the fact that the last census was the best ever taken in New Jersey, giving not only the population, but also the number of houses in the cities, and the number of persons living in the houses.

Mr. James Owen, C.E., Inspector of Essex county, reported every locality in Essex, but one township, has now an efficient Board of Health, and there had been great improvement in the sanitary condition of the county.

Dr. Saltonstall, Inspector of Hudson county, reported progress during the year, and that, in spite of obstacles that had been thrown in their way. Garbage and ashes were mixed, the removal of which had been left to more or less careless contractors. He had been compelled to secure an indictment by the Grand Jury against Jersey City for the defective sewers which deposited a large amount of sewage on the meadows. In Hoboken there is no Health Board, and they refuse to have one, but they have a Health Committee. The objection is that they have no money. He had suggested a crematory in the county for garbage, but the objection again was, no money. The water-supply from the Passaic and Hackensack rivers is plentiful, but, as to its purity, was not what it should be. They need very much a system of filtration. He thought that power should be vested in our Boards to determine as to the safety of foundations upon which buildings are to be erected. The death-rate of Jersey City is about twenty-three, which was larger than it should be.

Dr. Quimby thought the sewers of Jersey City were not large enough. That the Passaic water was fairly good.

Dr. C. B. Brush, C.E., of Hoboken, said the death-rate has fallen 6 in 1,000 since the introduction of the Hackensack river water.

Dr. Saltonstall insisted on the great need of filtration, even if the purity of the water was open to question.

It being about time to adjourn for the noon recess, the calling of the counties was suspended. The following resolution, offered by the Hon. E. O. Chapman, was unanimously adopted:

Resolved, That the Committee on Legislation be instructed to consider the advisability of a statute which will place the potable waters of the State under the care and protection of a State Board of Commissioners, and, if the committee deem it advisable, that they be requested to prepare and present to the Legislature a bill for that purpose.

Dr. Mitchell offered the following:

Resolved, That a committee of three be appointed to prepare for presentation to the Legislature a bill which shall provide for the safe construction of dwellings and especially of house drainage. Also to prepare and present a supplement to Chapter LXXX., Laws of 1885, respecting the cutting and sale of ice in cities and towns, to cause the provisions of said act to apply to all parts of the State.

This resolution and all other matters pertaining to legislation were referred with power to the Standing Committee on Legislation to be appointed by the Chair.

The President then introduced Prof. Rudolph Hering, C. and S.E., of Philadelphia, who read a very able and instructive paper, which is to be found in the present report. It was followed by a paper by the State Geologist, George H. Cook, of New Brunswick, on the "Value of Bored Wells for Domestic Use in Different Parts of New Jersey." [The paper will be found in full in the report of the State Geologist for this year.]

Prof. Charles McMillan, C.E., of Princeton, opened the discussion on Prof. Hering's paper. After expressing the opinion that the thoroughness of the paper left little for him to add, he said that when we speak of ventilating sewers the public should be taught that it is not the gases themselves that are so destructive to health and life, but

the germs or active agents which they carry. He also spoke on the subject of siphonage in traps, calling attention to one of the difficulties we meet with in manufacturers compelling the introduction of expensive traps when cheaper ones answer as well and in some cases much better.

Civil Engineer Brush and Dr. Hunt continued the discussion.

Civil Engineers L. B. Ward, James Owen and C. P. Bassett spoke on Prof. Cook's paper.

The following resolution was offered by Dr. Quimby:

Resolved, That the scourge of small pox in Canada is a sad result of the too-prevalent neglect of vaccination through ignorance or prejudice; therefore, we urge upon parents, physicians and school boards strenuous efforts to secure a more general system of vaccination.

Adopted.

Resolutions of condolence were adopted as to the death of the Rev. William Harris, of Princeton, and of Prof. George H. Barton, of Jersey City, both of whom were active members of the Association.

The Association elected Prof. James M. Green, of Long Branch, as its president, and various other officers.

Upon motion the annual meeting adjourned *sine die,* the general expression of the members being that it was the best of the series of meetings that the Association had held.

REPORT AS TO JAILS, PENITENTIARIES AND PRISONS, ALMSHOUSES AND ASYLUMS.

BY THE SECRETARY.

By section first of the act to be found Chapter CLXV., Laws of 1882, it was made a part of the service of the Board to visit charitable and penal institutions with the especial object of inquiring into their sanitary condition, and that of their inmates. With this class of our population, such an inquiry is almost inseparable from some inquiry into institutional methods and the management, since upon these their sanitary condition is chiefly dependent. On behalf of the State, there needs to be greater recognition of how large a class of population is included in these various institutions, and of how great an influence these exercise upon health, upon social conditions and upon our general prosperity. Besides the constant expenses of general sickness and ill health, we have witnessed at least three epidemics, owing to local conditions, one in an asylum, one in an almshouse and one in a reform school, which have cost in the aggregate about forty thousand dollars. This, however, is but a small item in the aggregate of expenditure. The average number in the asylums of the State is about two thousand inmates. "The local governments of our State provide for the support of not less than sixteen thousand in and out of door paupers, exclusive of indigent insane and vagrants or tramps." The cost of maintenance is over $443,000.

The entire cost to the State of maintenance of dependents in asylums and of paupers, is stated by the able report of the Bureau of Statistics and Industries (1883) as not less than $783,000. If we add to this the cost of buildings and the dependent families often represented, the aggregate is in the millions. One to about every seventy of the population thus dependent is an item needing very careful inquiry. All the more because of this number so many are

found to be suffering from avoidable ill health or to have been subjected to unsanitary conditions.

If we turn to the jails and penitentiaries we find the returns for the same year to be of over fourteen thousand inmates. Although many of these are recommitments, and so there are not so many persons, yet this large number gives an approximate idea of the actual count. Indeed the fact that there is such constant and frequent rotation between the jail or penitentiary and the outer world, makes the sanitary and social relations of this jail population fraught with still more weighty import for the people at large. The same may be said to some degree of the State Prison with its over eight hundred additional inmates. The report above referred to puts the total yearly cost of crime at $1,150,000, not including buildings. After a careful examination of these figures, and after a comparative study of those of some other States, we are within the bounds of caution when we place our whole number of dependent and penal population as represented in State and county institutions at over thirty thousand, or one to about every forty of our population. The yearly expense of maintenance is about $1,943,000. This includes none of the large incidental outside expenses, and so includes none of the expenses of courts and trials, and of the cities and counties in protecting the people against the criminal classes. There is millions in it. These are expenses that cannot be reckoned by any usual per capita. In the economies of the State, and all that relates to political economy and social and industrial welfare, this multitude has never been studied with that particularity and that consideration of public health and welfare which is demanded. Strange that so vital a concern should be so often regarded as only a respectable philanthropy.

Upon this Board first devolved the duty of some inquiry into this population in the interests of health, and of society.

The Bureau of Labor and Statistics was naturally drawn to the study by its intimate bearing on the labor and industrial interests of the State. From time to time citizens interested and well-informed in public affairs, have felt the gravity of the situation, and have, through pen and press, urged to greater attention on the part of the State. A Council of Charities and Correction has been formed in response to some awakened public interest. But it has not yet been able to operate to a degree sufficient to inaugurate a comprehensive system of improvement, prevention or relief. The statesman, not less

than the political economist, the sanitarian and the philanthropist must see that it is very wise for us to grapple with a problem which has so perplexed older countries, and which is already having too many sad or perilous solutions in our own State. Our asylums will continue to be overcrowded and to appeal for enlargement, unless, on the one hand, we can diminish the causes of mental imperfection, and on the other provide for a class of the afflicted without the appointments of a hospital, and of wards for treatment and restraint, and more fully substitute in their stead the healthful discipline of systematic employment.

Our almshouses will continue to fill, and entail upon us organized pauperism, unless there is an entire change in classification and discipline, and unless the pauper children are so separated and placed as to be trained out of this kind of dependency, instead of into it, and unless conditions of health are more fully studied and arranged for.

Our jails will continue to furnish material for disorder, disease and crime, more than they contribute to restraint, so long as they are made the rendezvous for promiscuous congregations of criminals of all grades and ages, together with disorderly or suspected persons, drunkards, tramps, vagrants, temporarily insane persons and witnesses. If to any the peril to the public health seems small, it is only so because the peril to public morals, to public thrift, and to public order is greater.

In visits to institutions we have been able to correct many defects, both such as were structural and such as had to do with the personnel of the inmates.

In our State institutions the facilities for sanitary care as to food, clothing, bathing, etc., are, in general, complete, and the discipline exact. The same may be said as to two or three of the county asylums; but in the others and in our county and town and city almshouses, there is, too frequently, a want of that system which secures clean bodies, clean outer as well as laundried clothing, and of that method of work and of classification which is essential to health. Often a bath-tub is not to be found, or its appointments are too incomplete to invite to its use. The overseer, while recognizing that clean floors, clean beds and good food are expected, as to all other matters seeks to commend himself by his economy. With no systematized oversight it so happens that here and there an overseer shows special tact for his work, and that the wife brings to bear her good training

in all the details of family care. While there are some such delightful exhibitions of correctness, it is not the rule, especially in the more crowded institutions. If one wishes to see what a bad system can do, he has only to visit the promiscuous crowds of the Hudson county almshouse, where children of all ages are being trained into pauperism, and those in charge are helpless to prevent it. On the other hand, the Newark City Home, at Verona, shows what can be done in relief. The entire pauper system of the various townships, cities and counties needs such regulation and restructure by legislative enactment, and such oversight from constituted authorities as would generally mitigate many of the evils which now exist. As to sanitary matters, it ought to be said that in some of the county houses many important improvements, as suggested by this Board, have been made. The sanitary condition of the State Prison is well guarded, and, with the exception of one building, is satisfactory.

OUR JAILS.

It must be said of the entire jail system of the State, that it is favorable to disease and crime. In this respect it is no worse than that of some of the other States. The language of Mr. A. C. Wright, of the State Board of Charities and Reform of Wisconsin, is too applicable in this State:

"It is a shame to the civilization of the country that we still persist in putting so many prisoners into utterly unhealthy places. It is hard enough for persons accustomed to outdoor life to stay all the time indoors in enforced idleness, without having the air poisoned with noxious stenches, foul breath and dampness. Our jails are not much better in this respect than the English jails of Howard's time.

"If proper sanitary arrangements are needed for the physical health of prisoners, a proper classification is needed for the moral well-being of many of them. When prisoners are herded together without distinction of age or character, the jails become schools of crime and vice. The hardened offenders teach the young and comparatively innocent, or those arrested for the first time, lessons in the art of preying upon society, and of breaking jail, or of otherwise escaping punishment. Here in the long and weary hours of imprisonment many a tale of past adventure in crime is rehearsed, many a plan is laid for future crime, many a jail friendship is made which will hereafter ripen into comradeship in crime, and many a plan of escape is concocted. The young are taught that 'the world owes them

a living,' and that it is not crime, but being caught in it, which is to be dreaded.

"Visiting a jail, you are liable to find mingled indiscriminately together (1) professional criminals waiting trial for state prison offenses; (2) non-professionals, who have committed some crime under temptation, but who do not live by crime; (3) innocent persons accused of crime; (4) insane persons; (5) persons sentenced to jail for petty offenses; (6) dirty tramps, sentenced as vagrants, or given lodging in the jail as a tramp hotel; (7) persons held as witnesses. In some counties the only place for a person who is sick and without money or friends is the jail. Boys are put in with men. All these persons are thrown together in enforced idleness. Their only labor in most jails is doing a few chores under the oversight of the jailer. Their only recreation consists in handling a greasy pack of cards, in telling low stories, or in looking at pictures with which the cell walls are often decorated. They rarely have any considerable amount or variety of reading matter.

"With few exceptions, prisoners sentenced to the county jail generally spend their time telling stories and playing cards. The easiest way for a lazy fellow to pass the winter is to steal something of small value, have a spree upon the proceeds, and then go to jail, where he is supported in idleness at the expense of the county. It is obvious that this is very poor economy, as well as an encouragement to petty crime to that part of the community who do not care for the name of being in jail. Such people ought not to be supported in idleness at the expense of the honest and industrious part of the community, and even if their work is not of very much value in itself, it is well worth while to keep them at work for its moral effect on themselves and others. Tramps especially flock to those jails where they are fed in idleness and shun the jails where they are treated to the labor test.

"The first thing a sheriff or jailer should do in taking possession of a jail should be to have a thorough house-cleaning, to get rid of all dirt and exterminate all vermin. He should have a house-cleaning as often as once a month thereafter, in addition to the daily sweeping and mopping. The beds should be filled with clean straw, which should be renewed frequently. Clean blankets should be given to each new prisoner, and they should be washed frequently. Clean white sheets and pillow-cases should be provided each week. The privy is usually the worst nuisance in the jail, which can be smelled at all seasons of the year, but especially in summer. No vault-privy ought to be allowed in a jail, and no sewerage unless properly flushed, as well as connected with running water. No cesspit should be connected with a jail. Unless the sewerage can be kept in good condition all the year round, it is better to use close-covered buckets emptied twice a day under guard."

There are but few of the inmates that have not the time and that could not profitably spend a half hour each day in bathing and the securement of personal cleanliness.

The discipline of a jail should be as complete as that of a prison. General assemblage is even more hazardous and more demoralizing here than in a prison. There are more reasons for separate confinement in jails than in prisons. It is admitted that on the first reception of arrested persons, and for short sentences, this is the desirable method. Where they are kept in corridors, it should be under military discipline, and without conversation.

There is no reason why tramps, drunken persons and those arrested for usual disorders, should be sent to the county jail.

If, by the provision of proper police stations, our jails could be delivered from these, it would at once simplify the management as to the rest. Prisoners could be placed with no more than two in a cell. Boys could always be separated. Persons detained as witnesses could have their own apartment. Labor could be systematized. Under such classification and discipline there would be less seeking of the jail for its social charms, and the ultimate expense to the counties would be lessened.

The report made by A. S. Meyrick to the Legislature of 1882, as our delegate to the National Conference of Charities and Correction, ought to be read yearly, by all interested in the care of population, and until some of the changes advocated in it are made.

The ordinary jail must at present be fitly described as a place of rendezvous for drunkards, tramps and vagrants of all ages and both sexes, to which are added a few deranged persons, and persons detained as witnesses, and a few who will be found to receive sentence to a penitentiary or a prison. Ill health, vice and crime are here aided.

In our jails every rule which, in prisons and in penitentiaries, has been found necessary for the discipline, punishment and possible reformation of criminals, is ignored. Instead of separate confinement or enforced silence or disciplinary work, the association is so promiscuous and so demoralizing as to have led Keeper Laverty, of the State Prison, after his long experience as sheriff and with jails, to speak of the "social charms of the jail."

By recurring again to the facts and statistics of the Labor Bureau, we find several facts to show how the health and welfare of the people at large is constantly affected by that of the unsettled jail population.

In an analysis of jail statistics from October 31st, 1882, to November 1st, 1883, we find the number in jails was 12,651, and the number in penitentiaries (Essex and Hudson counties) 1,967.

In the list of principal crimes and minor causes of imprisonment, we find some particulars are given (Bureau of Labor and Statistics, Sixth Report, p. 359,) as to 7,245. Of these, 3,097 were in jail for being drunk, drunk and disorderly, and disorderly. In addition, 1,156 were there as tramps and vagrants, and 116 for breach of peace, which also is included in minor offenses, since assault, battery, etc., has a separate list. Abandonment, desertion of family and non-support number 44. Out of the 7,245 as to whom particulars are given, this shows 4,413 who do not belong to the class requiring all the bolts and bars of criminals. These make up a vagrant population which really often seeks the prison as a boarding-house and a place of congenial companionship.

Of the 7,245, only 1,046 were sent to the penitentiary, which means that they are kept for a period of from three to eighteen months, none being kept over the latter time; 479 go to State prison, of whom, on an average, over one-half are detained less than two years. Of the rest, 137 go to reform schools and six to asylums (*Ib.* Table p. 364).

At a single glance we get the information that the jails, as now used, are but *partially* places for the detention of criminals, and that, on an average, each jail sends forth upon the public its entire population in much less than one year. For the table on page 364 (*Ib.*) shows that 8,270 receive some form of sentence, of which 1,259 are for five days or less, 5,315 between five days and one month, 793 between one and two months, 655 between two and three months, 122 between three and four months, 18 between four and five months, 112 between five and twelve months, and but 86 over a year.

Of the 486 sent to the penitentiaries, only 180 are for over six months, and of these only 11 over one year. Thus the jail population forms a special army of extra-hazardous population, only being kept apart from the general public at odd times, during which too many receive special training for crime or dependency.

This brief statement of facts as to one year, a comparison with statistics in some other States and the testimony of other observers, we believe fully shows what is the usual average as to brevity of sentence and as to the number of vagrants and drunkards that make up the usual jail population. A still further analysis shows that about one-fourth have their first commitment. These at least ought

to be placed somewhere where cleanliness, orderly habits and moral influence ought to be attempted, since in foreign jails it is found that not a few of such are led to reform. These sad conditions are not found in the English and Scotch jails, most of which we have found similar to our prisons and under close discipline.

We need to be fully impressed with the fact that the jail population of the State is not a separate population. It is a horde of extra-hazardous population which, in numbers not far from 10,000 a year, is sent forth to prey upon the other citizens of the State in various spendthrift forms, such as crime, disorder, drunkenness, ill habits and dependency. A tramp lodged in Camden County Almshouse cost that county over $20,000. The expense to Camden city for small causes last year was over $6,000. The haunts where the jail population congregate are the haunts of disease, no less than of vice. But what we most complain of is that the jails themselves train their inmates in habits that tend to physical, mental and moral degeneration.

As at present used, however desirous the wardens and sheriffs may be to conduct the jail properly, they are helpless to do so. Lack of sanitary accommodations, the herding of the inmates in the corridors, and the want of discipline as to clothing, bathing, laundry, etc., as well as the social arrangements, tend to make our jails a constant menace to the public health, public morals and public order.

Nor are we at all original in asserting this. We have never talked with a warden or sheriff or jail overseer of any large jail who has not deplored the promiscuous use made of our jails, and argued the impossibility, under present methods, of securing proper cleanliness, separation and order. We have never known an attendant physician who has not felt that there is risk to the public health from such methods. We have talked with some of the judges of our courts, and do not know of one but that recognizes the ordinary crowded county jail as an evil to public health and morals, and as a school of crime. Within three years one of the judges of the Supreme Court adjourned the court because of the sanitary condition of the jail beneath the court-room, which, in his judgment, endangered the health of court and jury. We believe the time has come when our Legislature should pass a law to prevent our jails from being the common receptacles for all vagrancy, and secure them to be kept as places that shall not increase our physical or social risks.

Besides our personal visits to institutions, it is now made the duty of local Boards to visit, once a year, any public institution within their jurisdiction and examine into its sanitary condition. The effect of all such inquiry is to correct evils and to induce more exact attention to health matters. The Secretary has, the past year, made personal examination of several of the jails, almshouses, and public institutions of the State. We have found the managers of institutions ready to receive all suggestions made, and to act upon them, except where there is hesitancy on account of expense. The facts in evidence have, in many instances, led to important structural and administrative alterations. This Board will continue to co-operate with the State and local authorities in all that pertains to the health of premises, of buildings, and those committed to these institutions, as well as to such other concerns as incidentally have the most intimate relations to sanitary welfare. Reference for other facts and statements may be had to former reports of the Board, and especially to articles to be found in the Fourth (1880), the Sixth (1882), and Seventh (1883) Reports. But all will be only commendable patch-work until the law makes some radical change as to our jails, almshouses and smaller asylums, and thus seeks not only to improve these, but to diminish their influence in causing dependency and crime.

PREVALENT DISEASES AND SPECIAL EPIDEMICS IN NEW JERSEY,

FROM JUNE, 1877, TO JUNE, 1885.

BY DAVID WARMAN, M.D.

"The sanitary reformer is not to wait for the advent of epidemical or preventable diseases. It is rather when a country is free from such that he can best work in removing or mitigating all those causes which act against the health of man."—*Stokes on State Medicine.*

Diseases, that is to say, ordinary diseases, those not arising from individual or constitutional causes, are usually divided into two classes—epidemic and endemic. The latter comprises those met with constantly in certain countries or localities; as, for instance, malarial diseases in the alluvial districts of temperate climates. Epidemics, on the other hand, are those peculiar affections which, springing up suddenly in some particular spot, spread over a certain portion of the habitable globe, and then disappear altogether.

After an interval of longer or shorter duration, they re-appear, prevail for a given period, and then subside, but only to repeat the same series of phenomena again and again, sometimes for centuries.

The object of the present paper is to place on record a short history of the epidemics, endemics and all preventable diseases that have occurred in the State of New Jersey for the last seven years, as compiled from the reports of the State Board of Health and the transactions of the State Medical Society, commencing with May, 1878, and ending May, 1885.

These accounts are very full from every portion of the State, but, owing to the long period of time covered by them, must necessarily comprise only a brief summary.

We have classified all the facts recorded as to any one county

together, so that whatever of importance has been stated as to communicable or preventable diseases for each year and in each county may be seen at a glance for the entire years. By referring to the tables of each year, as to the diseases in that county, comparisons can be made. These show how the same disease is more fatal at one period than another, and how great variations there are for the whole number of years in different localities. Where, for any one year, there has been nothing of special interest reported, no record is here repeated, but the tables in each report show the actual deaths.

ATLANTIC COUNTY.

FOR THE YEAR ENDING JUNE, 1881.

The report for this year commences with the following words:

There is a strong sentiment prevailing in the direction of preventing disease by the institution of rigid sanitary inspection, and the establishment of "Boards of Health with increased if not ample executive power."

An epidemic of small-pox in the spring, embracing thirty cases, of which nine were fatal. Vaccination is believed to be an absolute protection, and the neglect of revaccination is regarded as the only cause of the presence of the disease. Rotheln prevailed in a mild form; also whooping-cough.

FOR THE YEAR ENDING JUNE, 1883.

No epidemics except influenza, which seems to have been widespread. Only a few cases of typhoid fever were noticed.

In the village of Buena Vista a number of cases of diphtheria occurred. In a few localities measles and scarlet fever, of a mild form, prevailed.

FOR THE YEAR ENDING JUNE, 1884.

A severe epidemic of dysentery visited Hammonton, New Germany and Elwood. Measles also prevailed epidemically. Rotheln was quite prevalent at Atlantic City during autumn and early winter. Hamilton township reports a large number of cases of typho-malarial fever. These were quite typical cases of typhoid fever, and several died—supposed to have been caused by impure water and the unusually low state of the streams, &c.

FOR THE YEAR ENDING JUNE, 1885.

Measles, whooping-cough, scarlet fever and diphtheria were observed; also a few cases of genuine typhoid fever. The three diseases to which our attention has been attracted for the past year are malarial fever, diphtheria and typhoid fever.

BERGEN COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

There is reported a mild form of scarlet fever during the months of May and June, as prevalent in Fort Lee, Englewood and Schraalenburgh.

Hackensack reports the prevalence of a mild form of diphtheria and scarlet fever.

In Tenafly an epidemic of gastro-enteric dysentery began in July. It extended to Englewood, and in the latter place and districts adjacent, during August and the fall months, dysentery of an asthenic type, with great depression of the nervous system, prevailed. All grades of society were affected to some degree, but it was more severe and fatal among the laboring classes. Some of the principal exciting causes were bad water in the dry season, and malaria consequent upon bad drainage. In families where the greatest number of fatal cases occurred, the diet was salt bacon and salted shad, but principally bacon of inferior quality and poorly cooked. It was, upon examination, found to contain trichina spiralis. Many cases assumed a typhoid type, and were, from the commencement, beyond the aid of medicine.

A mild epidemic of measles and whooping-cough prevailed at Closter; also measles and scarlet fever, and a few cases of diphtheria. Malarial fevers and influenza have been very prevalent all over the county.

FOR THE YEAR ENDING JUNE, 1879.

Malarial fevers have prevailed as extensively as heretofore. An epidemic of influenza raged extensively throughout the county. Malignant scarlet fever prevailed at Schraalenburgh.

FOR THE YEAR ENDING JUNE, 1880.

Nearly all grades of fevers have existed throughout the year, but chiefly intermittents. Measles and whooping-cough, and, in some localities, mumps, have abounded; in one district the two former ceasing because of lack of subjects.

FOR THE YEAR ENDING JUNE, 1881.

Almost universal prevalence of measles during the months of May and June, followed by whooping-cough. In Union township malarial diseases are attributed to the lowness of the water and its poor quality. The same complaint is made at Saddle River and Midland townships.

At Palisades mild epidemics of measles and roseola, also an epidemic of dysentery, which seemed to be the outcome of malarial conditions.

FOR THE YEAR ENDING JUNE, 1882.

Periodical fevers of all types prevailed throughout the year, and nearly all other diseases showed a marked tendency to periodicity. In some localities these fevers assumed a typhoid character; of scarlet fever but few cases occurred.

Follicular tonsilitis prevailed in and around Englewood in epidemic form. One case of small-pox is reported at Rutherford Park.

FOR THE YEAR ENDING JUNE, 1883.

The malarial fever was about as prevalent as usual. A large number of cases of typhoid fever are reported. Scarlet fever and diphtheria was quite prevalent—the disease, however, of mild type.

Malarial fevers always present during summer and autumn; but during the last few years it has been observed that they have been gradually decreasing, while fevers of a typhoid and typho-malarial character are taking their place. Scarlet fever and diphtheria have been occasionally met with. An epidemic of measles, with a peculiar eczematous eruption behind the ears, prevailed. Influenza and follicular sore throat were epidemic. The latter was conspicuous by its contagious character. Typho-malarial fever continued to an alarming extent at Englewood. This epidemic is stated to have originated from the use of impure water, with defective plumbing, during the season in which malaria is most prominent.

FOR THE YEAR ENDING JUNE, 1884.

There has been a marked decrease of malarial diseases during the year. Typhoid fevers were infrequent, and mild in character. Influenza prevailed less extensively during the winter months than usual. Diphtheria and scarlet fever were met with in several localities.

BURLINGTON COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

In Bordentown obstinate intermittent fever prevailed. In Burlington city malarial fever, which was so common ten years since, is now a rare disease. Its disappearance is attributed to the drainage of the surrounding low ground, and the filling up of the small ponds. In Moorestown diphtheria was epidemic, while a few cases appeared in surrounding neighborhoods. In Mount Holly scarlet fever, diphtheria and roseola have all prevailed in a marked form, but to a limited extent. The first case of diphtheria was clearly traceable to infection, having been conveyed by a child who had come from the house of a diptheritic patient to a Sunday-school, one mile distant.

FOR THE YEAR ENDING JUNE, 1879.

In Medford there was a severe epidemic of influenza, diphtheria and scarlet fever, not general in any place, but it has prevailed in most parts of the county. In one locality it assumed an aggravated form, and the reporter was disposed to charge the attacks to the use of filthy well-water in one case, and in others to the proximity of the dwelling to privy-vaults, pig-styes and cow-pens.

FOR THE YEAR ENDING JUNE, 1880.

Malarial fever, which has not appeared for two years, again returned in August and September, caused, in the opinion of the reporter, by luxuriant vegetable growth. The only epidemics reported are those of mumps and pseudo-diphtheritis—in Mount Holly.

FOR THE YEAR ENDING JUNE, 1881.

The report notices malarial fever as ubiquitous. Roseola has prevailed extensively. Scarlet fever has appeared occasionally of mild form. There have been a few cases of typhoid fever in some localities. The reporter from the county says: "The people are awakening to the importance of having their premises cleanly, and of arranging apparatus by which they can more effectually carry off refuse; thereby promoting the welfare of the public health—the community having learned to prize that boon more than riches."

FOR THE YEAR ENDING JUNE, 1882.

Periodic fevers were the principal fevers. Typhoid fever was less prevalent than usual.

FOR THE YEAR ENDING JUNE, 1883.

An epidemic of influenza began in May and ended in June. An epidemic of rotheln also occurred. The reporter says: "Diphtheria we have always with us, but never as an epidemic."

FOR THE YEAR ENDING JUNE, 1884.

The fevers were of the intermittent and continued forms. Typical typhoid was rarely observed. Mumps appeared epidemically throughout the county. Measles and whooping-cough occurred in many towns. Scarlet fever was rare and mild; only a few cases reported.

Diphtheria was met with at Mount Holly and Moorestown. At the former place it displayed a malignant character. Its origin was attributed to defective drainage. One case of confluent small-pox is reported.

FOR THE YEAR ENDING JUNE, 1885.

Much less of malarial fevers than is common, with only an occasional occurrence of typhoid fever. Scarlet fever appeared in Burlington in August, and again in the spring. Twenty-five per cent. of the cases proved fatal. Dr. Hall mentions as many as twenty-five cases of diphtheria in his practice. Measles, whooping-cough and influenza were observed in various localities during the winter. The only epidemic mentioned is that of ulcerated tonsilitis in the city of Burlington, which was very severe and lasted for three months.

CAMDEN COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Periodical fevers were common in Camden city during the first half of the year, and in some parts almost epidemic. In many localities the origin could be traced to excavations in unfavorable places.

In Haddonfield the only disease to employ the chief attention of medical men was the "never-failing though often-varying malarial fever."

Diphtheria was very prevalent throughout the city of Camden, with a large per-

centage of deaths. In Haddonfield an epidemic of diphtheria broke out, but was confined to an academy in the place. Twenty of forty-five scholars took the disease; two only died. In August diphtheria suddenly made its appearance in Atsion, a small village in the interior of the county. The contagion spread throughout the town. One fourth of the cases were of a malignant form.

Scarlatina of a mild type reported from various parts of the county.

FOR THE YEAR ENDING JUNE, 1879.

A tendency to periodic forms of disease. There has been a large increase of typhoid fever, with less of those of the intermittent and remittent form. Influenza visited the county in epidemic form. In Blackwoodtown intermittent and remittent fevers were endemic and some typhoid.

FOR THE YEAR ENDING JUNE, 1880.

Malarial fevers have prevailed to an unusual extent in the upper part of the county, and in the city of Camden.

In the almshouse at Blackwoodtown the invasion was attributed to the excavations in moist ground, preparatory to new buildings for the institution. An endemic of typho-malarial fever is noticed as occurring in a circumscribed limit, with a mortality of eighteen per cent., supposed to have its origin in the use of putrescent manures from the slaughter-houses of Philadelphia. An epidemic of influenza is reported in Camden city, which lasted nearly all winter.

Measles and mumps have been endemic in Haddonfield, the latter occurring mostly among men, with frequent metastasis. Four cases of small-pox are reported—one in Delaware township, which occurred in a laborers' boarding-house, and three in Stockton township. They were all promptly attended to, houses fumigated, and vaccination performed. There was no further spread of the disease.

FOR THE YEAR ENDING JUNE, 1881.

Intermittent and remittent fevers have prevailed at all seasons of the year, with unusual severity. Every month of the year witnessed cases of diphtheria, except July and August. There has been more scarlet fever than usual, and some cases malignant and fatal. There was an extensive epidemic of rotheln. Measles, mumps and whooping cough have been prevalent, and a continual annual increase is apparent of typhoid fever. Small-pox prevailed to an alarming extent, there being in all 688 cases, and 134 deaths. An epidemic of typhus fever occurred in the county almshouse and hospital at Blackwoodtown, attributed to overcrowding, poor ventilation, &c.

FOR THE YEAR ENDING JUNE, 1882.

Periodical fevers have prevailed to a larger extent than ever before in all parts of the county. Typhoid fever has continued to harass the city of Camden. A peculiar epidemic of catarrh was also prevalent in the city of Camden, and in Winslow. Dr. Smith, of Gloucester City, reports numerous cases of diphtheria.

The report from Camden says, no epidemic but mumps. In Camden city typhoid fever prevailed to an unusual extent, but diphtheria and small-pox were almost absent. Scarlet fever prevailed as usual. Influenza was more prevalent than last year. Malarial fever not as frequent. In Gloucester City malarial fever prevailed through-

out the year, while only a few cases of diphtheria were seen. There were more cases than usual of scarlet fever and measles. In Blackwoodtown scarlet fever, whooping-cough and mumps prevailed. Two cases of small-pox occurred.

FOR THE YEAR ENDING JUNE, 1883.

Malaria has been ever present. Typhoid fever, so general in former years, has been less frequent. Scarlet fever and diphtheria has been frequently met with, but of a mild form. Measles prevailed in some localities. There was a single case of small-pox in Stockton township.

FOR THE YEAR ENDING JUNE, 1884.

Malarial fevers prevalent all the year round, but much more easily brought under control than formerly. Typhoid fever has been less frequent. The average amount of scarlet fever, diphtheria and measles came under observation. In the autumn malignant diphtheria broke out in a school in Camden. The cause was attributed to drinking-water for the use of the children, which was obtained from a well located within fifteen feet of two large cesspools. A mortality of fifty per cent. closes the story of criminal neglect.

CAPE MAY COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Diphtheria is reported as one of the constant diseases since 1860: never passing a month without giving evidence of its presence, but generally confined to localities so circumscribed as to forfeit its epidemic character.

FOR THE YEAR ENDING JUNE, 1879.

Diphtheria still continues endemic.

FOR THE YEAR ENDING JUNE, 1880.

In the autumnal season the annual visitation of malarial fevers was not delayed. Whooping-cough amounted to an epidemic. Typhoid and typho-malarial fevers were quite prevalent during the winter; and some influenza.

FOR THE YEAR ENDING JUNE, 1881.

Malarial fevers have been too common during part of the year. Measles, whooping-cough and rotheln were prevalent, but not fatal.

FOR THE YEAR ENDING JUNE, 1882.

There has been a general immunity from epidemics of every kind. A few scattered cases of scarlet fever, diphtheria, chicken-pox, whooping-cough and mumps have occasionally appeared.

FOR THE YEAR ENDING JUNE, 1885.

The district is almost exempt from malarial diseases. Only a single case of diphtheria is reported to have occurred. Typhoid fever rarely seen. An epidemic of measles prevailed at Tuckahoe.

CUMBERLAND COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Measles, diphtheria, scarlet fever and typhoid fever. Measles prevailed epidemically in Bridgeton through the early part of winter; also through Deerfield and Hopewell townships. Vineland reports measles and diphtheria as prevailing epidemically, and suggests that local moisture in a stagnant form bears a close relation to the propagation of diphtheria.

The most striking feature in the medical history of the county, was the appearance of an epidemic of typhoid fever in a neighborhood lying between Fairton and Cedarville, a mile and a half in extent. A swamp had existed there which had been imperfectly drained, and during rainy seasons had encroached upon the surrounding farm lands. The land-owners decided to repair the existing partial drains, and thus gain to themselves much fertile lands. The rank vegetation left behind the completed drainage, was allowed to decay at leisure and became the recognized cause of the disease.

FOR THE YEAR ENDING JUNE, 1879.

Influenza was the predominant affection during the winter months. It was epidemic throughout the whole section. Fevers have appeared, but in a limited degree. Intermittents, though occasionally observed, are rare in this district, as there is little malaria. In Vineland and Millville there are none in the technical sense of the term. There is a little scarlatina in a mild form. In some localities diphtheria has prevailed to a considerable degree.

FOR THE YEAR ENDING JUNE, 1880.

In Bridgeton diphtheria and scarlet fever nearly approached an epidemic form. The latter disease has appeared in nearly every town in the county.

An epidemic of ulcerative sore throat is noticed as occurring in Fairton among the children of the primary department of the public school. The windows of the apartment opened toward the uncleanly and neglected water-closets, which were recognized as the cause of the disease. About thirty cases, all severe, with one death.

FOR THE YEAR ENDING JUNE, 1881.

A greater amount of sickness of an epidemic and contagious character than for several years past. Diphtheria, scarlet fever, measles, mumps and whooping-cough prevailed extensively throughout the entire year. Malarial fevers have appeared occasionally. During the autumn and winter there was typhoid fever. Rotheln affected about one-third of the population.

FOR THE YEAR ENDING JUNE, 1882.

Malarial fevers prevailed to a considerable extent, and most other diseases showed a marked tendency to periodicity. In the opinion of the reporter the lowness of the streams and mill-ponds from the deficient rain-fall, with their surfaces stagnant and their borders exposed to the hot rays of the summer's sun, developed the requisite conditions for the production of the malarial poison. In Bridgeton city, diphtheria prevailed to an alarming extent. About thirty-two deaths occurred.

FOR THE YEAR ENDING JUNE, 1883.

This entire district was pervaded by an epidemic of influenza. Diphtheria was observed only in Fairfield and Maurice River, and scarlet fever scarcely anywhere except Millville. Measles has prevailed extensively. Cases of periodical fevers were less numerous, and the same may be said of typhoid fever. Chicken-pox was epidemic.

FOR THE YEAR ENDING JUNE, 1884.

Measles and mumps were the only noticeable epidemics. Typhoid fever moderate and about the same as previous years.

FOR THE YEAR ENDING JUNE, 1885.

A remarkable freedom from epidemics of all kinds, save one, of membranous laryngitis, in the villages of Fairton and Cedarville. The mortality was as high as eighty per cent. Dr. Bateman attributes its origin to local causes. Fevers were unfrequent, and only an occasional case of typhoid fever was observed.

ESSEX COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Malarial diseases have prevailed to a greater extent than has been known for a long period. Of the contagious and infectious diseases, measles alone have abounded. Influenza appears to have been prevalent in some parts of the county.

FOR THE YEAR ENDING JUNE, 1879.

Malarial diseases have been more frequent than for several years. Influenza has been prevalent. Of the contagious diseases, measles have been the most common.

FOR THE YEAR ENDING JUNE, 1880.

Malarial affections have been less frequent than in the last few years. An observer in Caldwell remarks upon four cases of follicular tonsilitis in a family of six children. The four sick ones drank of the water of a cistern in close contact with the leaky kitchen drain-pipe; the two healthy ones preferred to drink water from a well in the yard.

FOR THE YEAR ENDING JUNE, 1881.

An increase of malarial fevers within its entire boundary. During the autumn and winter diphtheria held a conspicuous place on the mortuary records. Rotheln began in Newark during the winter and spread throughout the county. Small-pox existed in Newark and Orange to some extent, with only two deaths.

FOR THE YEAR ENDING JUNE, 1882.

Malarial fevers have prevailed as usual. Typhoid fever has been somewhat on the increase. Diphtheria and measles have prevailed to a moderate degree. Cases of

scarlet fever have been more numerous, and the death-rate decidedly higher than usual. Small-pox, which created so much alarm last year, has prevailed to nearly the same extent this year.

FOR THE YEAR ENDING JUNE, 1883.

An epidemic of measles and mumps. Scarlet fever has prevailed to a somewhat greater extent than usual, in Newark and Orange, but outside of these cities the cases have been few. Malarial disorders have prevailed as usual, although more severe and obstinate forms have been less common.

FOR THE YEAR ENDING JUNE, 1884.

Typhoid fever was of rare occurrence. Measles ran mildly through the families whose children attended the district school in the northern part of Montclair. There was much whooping cough in various parts. In Orange and Newark, diphtheria occurred during the winter, of marked malignancy, originating from local causes. The decrease of malarial diseases has been remarkable.

FOR THE YEAR ENDING JUNE, 1885.

Diphtheria, scarlet fever, measles and mumps have, chiefly, prevailed. Diphtheria and scarlet fever were endemic in Newark. The entire number of cases of diphtheria was 227, and deaths 65; 178 cases of scarlet fever, with 20 deaths. Much less malaria prevailed.

GLOUCESTER COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

No epidemic of a serious nature, though local epidemics, such as scarlet fever, measles, and whooping-cough, have occurred.

During the autumn there was a general malarial tendency to disease. There was a widespread epidemic of influenza, with numerous cases of bronchitis and pneumonia. The following diseases are reported as having been endemic, viz : Tonsilitis, mumps, measles, scarlet fever, and typho-malarial fever. Four cases of small-pox occurred in the township of Mantua. Prompt attention prevented the spread of the disease.

FOR THE YEAR ENDING JUNE, 1880.

Tonsilitis was reported as prevalent in Williamstown and Paulsboro. Measles and scarlet fever and typhoid fever in Williamstown and Mantua.

FOR THE YEAR ENDING JUNE, 1881.

Malarial fever is reported only at Swedesboro; Paulsboro and Mantua, small-pox and rotheln; typhoid fever and measles at Clayton.

FOR THE YEAR ENDING JUNE, 1882.

Eleven cases of small-pox at Glassboro, and it was found necessary to build a hospital. No deaths occurred from the disease. Isolation and vaccination prevented its

spread. The principal diseases reported are consumption and malaria. Both are very prevalent, and alarmingly on the increase. Glass-blowing is thought to cause the consumption.

FOR THE YEAR ENDING JUNE, 1883.

Cases of malarial fever, although prevailing to a considerable extent, have not been so numerous as last year. What cases of typhoid fever have come under notice have been traceable to stagnant pools of water and incomplete drainage.

FOR THE YEAR ENDING JUNE, 1884.

No malignant epidemics have appeared anywhere. Mumps, measles and scarlet fever were occasionally observed. Malaria was present in every season throughout the year. Only a few cases of typhoid fever reported.

FOR THE YEAR ENDING JUNE, 1885.

Malaria has exerted its pernicious influence as ever before, and is felt in all the maladies that come under the physician's attention. No epidemics have prevailed of a malignant character, though local endemics, mild in their nature, have been exceedingly common. Only isolated cases of typhoid fever were observed anywhere in the district. Whooping-cough and chicken-pox prevailed extensively in the entire county.

HUDSON COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

There has been a predominance of malarial diseases. Epidemics have been absent, or of a very limited duration.

Diphtheria, which is never absent, has not presented any notable epidemic form.

FOR THE YEAR ENDING JUNE, 1879.

Scarlet fever has been the only epidemic. The death-rate from diphtheria has been lower than in any of the previous five years. Diseases of the air passages have been widespread, especially influenza.

FOR THE YEAR ENDING JUNE, 1880.

Vernal and autumnal influenza, supposed to be due to miasm, has been prevalent. Small-pox and varioloid were somewhat troublesome, but did not become epidemic till December. The number of cases of the former being about four hundred, with a death-rate of thirty-three per cent. Diphtheria and scarlet fever are named by the reporter as constant companions. Rotheln has been more abundant than usual.

FOR THE YEAR ENDING JUNE, 1881.

Healthy to a remarkable degree. No epidemics.

FOR THE YEAR ENDING JUNE, 1883.

Malarial fever continued to predominate. In the western part of this county an epidemic of bronchitis has prevailed, especially among children.

FOR THE YEAR ENDING JUNE, 1884.

The year has been remarkable for the general healthfulness of the people. A few cases of diphtheria, measles, scarlet fever and typhoid fever are reported. An outbreak of small-pox took place in Hoboken, in July. Prompt vaccination was enforced by the Health Board, and the disease quickly disappeared.

FOR THE YEAR ENDING JUNE, 1885.

Has been freer from malarial fevers than for several years past. Measles, diphtheria and typhoid fever were each observed less frequently. Scarlet fever was chiefly observed in Jersey City. The only cases of small-pox reported as having occurred in the State were at Union Hill, in April—two in number; one died.

HUNTERDON COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Hunterdon county has not experienced any tendency to epidemic or endemic disease, except in Lambertville and vicinity, where scarlatina and diphtheria have been more prevalent than for many years, and in a very severe form on the high ground of West Amwell, east of the city. The majority of all the cases died within three to ten days after invasion.

FOR THE YEAR ENDING JUNE, 1879.

Has been free from epidemics or any general severe disease, excepting only influenza, which has been quite general.

FOR THE YEAR ENDING JUNE, 1880.

Malarial fevers have prevailed to a considerable extent along the Delaware river. There has been occasionally a case of diphtheria.

FOR THE YEAR ENDING JUNE, 1881.

Has experienced some severe epidemics. Malarial fevers have prevailed in all parts of the county, but especially along the line of the Delaware river. Scarlet fever, in all its forms, was the midwinter epidemic. There was much whooping-cough in the early spring. Measles prevailed extensively in May, June and July.

FOR THE YEAR ENDING JUNE, 1882.

Malarial fevers were endemic during the entire year; even in the severest winter weather cases were seen. Typhoid fever prevailed to a considerable extent, especially in the Delaware valley. Scarlet fever, measles and whooping-cough were epidemic, but mild in form, causing but few deaths.

FOR THE YEAR ENDING JUNE, 1883.

Chicken-pox, mumps and measles have prevailed throughout the year. Scarlet fever and diphtheria were prevalent during the winter. Influenza was especially severe throughout the Redshale valley. Intermittent and remittent fever prevailed as usual in the valley of the Delaware, and the low lands along the South Branch. Of typhoid fever only a few cases were seen.

FOR THE YEAR ENDING JUNE, 1884.

Has experienced mild epidemics in nearly every section. A severe form of scarlet fever in the Musconetcong valley. Measles, whooping-cough and mumps were prevalent. Malarial fevers have been less in number than for years past. Three cases of typhoid fever occurred in one family. The cause was traced to a spring situated near the house: said spring being so located as to receive deleterious substances that emanated from pig-pen, barn-yard, &c. The use of the spring being abandoned, no further trouble ensued in the family.

FOR THE YEAR ENDING JUNE, 1885.

Measles were widespread in Lambertville in the summer, and at the same time a few scattered cases of scarlet fever. Only a few cases of typhoid fever were seen. Influenza and roseola were epidemic, while mumps annoyed many neighborhoods. Malaria is reported as subsiding.

MERCER COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

The city of Trenton has been visited with epidemics of diphtheria, scarlet fever, measles and whooping-cough. Diphtheria, quite malignant. Scarlet fever, mild. Measles assumed a severe type, and in some cases proved fatal. Typhoid fever was endemic during the autumn, and was generally traced to either polluted water or bad drainage. In some localities the disease was quite malignant; three or four dying from it in some families in rapid succession. Malarial fever has been more common in the city of Trenton and at Hightstown than for several previous years; associated with hemicrania of a periodical type.

FOR THE YEAR ENDING JUNE, 1879.

Trenton has experienced a large increase of malarial fevers. Influenza was protracted and severe. Diphtheria in a fatal form prevailed in the early part of spring. Erysipelas of the head and face the reporter classes among the epidemics of Trenton. He further says there has been an alarming increase of all zymotic diseases in the city of Trenton for the last ten years, owing entirely to bad sanitary conditions from want of sewerage.

FOR THE YEAR ENDING JUNE, 1880.

Malarial fevers have prevailed to an extraordinary extent in Hightstown and East Windsor, the locality having been for many years free from anything of the sort. A

great deal of malaria has also prevailed in Ewing township; the direct cause is said to be Keeler's mill pond. Twenty-three families out of twenty-five have suffered more or less all summer—all living on or near this pond. Typhoid fever prevailed at Princeton during the months of April, May, June and July. There occurred in all about forty cases, and eight deaths.

FOR THE YEAR ENDING JUNE, 1881.

A few cases of small-pox, with only two deaths. Active vaccination prevented its spreading. Malaria has been quite prevalent in most portions.

FOR THE YEAR ENDING JUNE, 1882.

Small-pox has existed in portions of the county. In Trenton sixteen cases were reported, with a fatality of thirty-three per cent. Seven cases occurred in Pennington, all of which recovered. In Lawrenceville and Princeton it prevailed to a limited extent. In Trenton and Chambersburg typhoid fever was limited to a few localities. Measles of a malignant character prevailed at Hightstown, accompanied with hæmaturia. Malarial diseases have not been as prevalent as formerly.

FOR THE YEAR ENDING JUNE, 1883.

In Trenton and some of the surrounding towns, small-pox prevailed extensively. Malarial fever abounded. An epidemic of diphtheria, causing a number of deaths, occurred during the winter. Short epidemics of scarlet fever and measles, mostly of a mild type. An endemic of typhoid occurred in Chambersburg.

FOR THE YEAR ENDING JUNE, 1884.

Measles prevailed epidemically in South Trenton and Chambersburg. Diphtheria and scarlet fever occurred in the form of sporadic cases pretty much the entire year. Malarial fevers have been less prevalent. Mumps were general throughout the city of Trenton, complicated with orchitis.

FOR THE YEAR ENDING JUNE, 1885.

A local outbreak of diphtheria occurred near the State Lunatic Asylum. A number of cases were also met with, during the year, in Trenton. Sporadic cases of measles and scarlet fever in Titusville. Whooping-cough prevailed, to some extent, over the county.

MIDDLESEX COUNTY.

FOR THE YEAR ENDING JUNE, 1881.

The year has not been marked by any special epidemic influences. Some typhoid fever and a few cases of small-pox occurred in New Brunswick.

FOR THE YEAR ENDING JUNE, 1882.

In New Brunswick there were several cases of typhoid fever, which have been mostly attributed to the use of water taken from pumps. A few cases occurred near sewer basins. In Metuchen and Dunellen cases of diphtheria of marked malignancy

have occurred. Measles have been quite prevalent. Malarial diseases have not prevailed quite so extensively as last year. A few cases of small-pox have occurred. More attention than usual has been given to vaccination in all parts of the county.

FOR THE YEAR ENDING JUNE, 1883.

Epidemic diseases prevailed in different localities during the year. An epidemic of diphtheria of a severe type visited New Brunswick, Metuchen, Woodbridge and Perth Amboy. Scarlet fever has been more prevalent than any other communicable disease. A wide-spread epidemic of measles occurred in the whole of the river district of Raritan and Piscataway townships. Malarial fever has been very abundant throughout the entire year.

FOR THE YEAR ENDING JUNE, 1884.

Epidemics have been mild in character, except one of diphtheria, in New Brunswick. There have been a few cases of scarlet fever and whooping-cough. Malarial fevers have not decreased much.

FOR THE YEAR ENDING JUNE, 1885.

Typhoid fever of quite a severe type occurred in New Brunswick and Woodbridge. Diphtheria was also prevalent in New Brunswick. Measles were widely epidemic. Influenza prevailed everywhere throughout the winter months. Whooping-cough and scarlet fever were quite general also, but both were altogether of a mild character. Malarial fevers were met with to the usual extent.

MONMOUTH COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Suffered less by sickness than in former years. Two localities are excepted from this statement. At Point Pleasant diphtheria appeared in October, and was endemic for six weeks. The cases were mostly malignant, and proved fatal in three or four days. Of forty cases fifty per cent. died. One physician lost ten out of fifteen cases. Dr. Laird, who reports the epidemic, notices the following striking fact: "The first case occurred during a revival in the Methodist Church. I warned the clergyman of the danger of exposing the Sunday-school children to this corpse. Notwithstanding, the coffin was opened in the church, and a procession of the school marched around and viewed the corpse. In a few days I had plenty of patients."

Query—Did the corpse inoculate the school? Every case was within a half mile of this church.

In Keyport, along the shores of the bay, between the town of South Amboy and for a distance of three miles in the interior, malarial fevers have prevailed to a greater extent than ever before. In the same district scarlet fever occurred, followed in many cases by grave sequelae.

FOR THE YEAR ENDING JUNE, 1880.

Malarial fevers are still quite prevalent here. Measles and mumps epidemic in many parts of the county.

FOR THE YEAR ENDING JUNE, 1881.

Scarlet fever is reported at Asbury Park as epidemic during a portion of the summer. Wide-spread malarial fever at Eatontown and vicinity, attributed to the impeded course of Mill Brook by willows, rubbish, &c. The reporter remarks, "If we would keep our coast clear of malarial invasion, we must preserve the natural drainage, and add artificial drainage to make up for the changes which population introduces." Reports come from several of the townships "That the water has been very low in the wells and many of them are dry. Malarial fever has made its appearance where it was never known before, and is supposed to be caused by the impure state of the water." Red Bank reports the first appearance of malarial fever in this section of the county.

FOR THE YEAR ENDING JUNE, 1882.

Scarlet fever and rotheln, of a mild form, are reported. Small-pox prevailed at Keyport and Freehold. At the latter place it occurred in the center of the town. Proper quarantine of the whole block was instituted and the disease was confined to the house in which it first originated. The report from Freehold gives interesting details in which vaccination prevented the small-pox in two children who were vaccinated two days after the father had broken out therewith. They contracted the disease, but had a mild form of varioloid.

FOR THE YEAR ENDING JUNE, 1883.

A remarkable epidemic of diphtheria and scarlet fever frequently inter-current in the neighborhood of Keyport. Typhoid fever at Asbury Park; nine cases, mild in character; only one death. Upper Freehold reports an extensive epidemic of measles, and a few cases of typhoid fever. Malaria in a few localities, but not so frequent as formerly.

FOR THE YEAR ENDING JUNE, 1884.

Free from epidemics. No contagious diseases have prevailed except measles. Typhoid fever was common in different parts of the county during the autumn.

FOR THE YEAR ENDING JUNE, 1885.

An epidemic of measles ranged over many parts of the county, particularly through Matawan, Ocean Beach and Freehold, attended by a high degree of mortality.

MORRIS COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

In Boonton there has been an increased amount of malarial diseases among a portion of the people, who, for want of their usual employment in the iron mills, have engaged in ditching on the farms. The same condition has obtained in Chester and Dover.

In Parsippany intermittents were followed by an epidemic of dysentery of a decided malarial type.

In Pompton malarial fever has been the prevailing disease, followed with diarrhea of an intermittent character.

All diseases in the county are reported as assuming more or less of a periodic type. Influenza was epidemic. Diphtheria and scarlatina prevailed to a considerable extent in all parts of the county. Isolated cases of typhoid fever and rubeola have been met with.

FOR THE YEAR ENDING JUNE, 1879.

An increase in the number and severity of malarial disorders. The localities near the larger streams, ponds, canals and low meadows have suffered most. The county has been free from epidemics of scarlet fever and diphtheria. All the minor contagious diseases have been epidemic—measles, whooping-cough, mumps, chicken-pox, and in some places all prevailing at the same time.

FOR THE YEAR ENDING JUNE, 1881.

The prevailing disease has been malarial fever, chiefly of the intermittent type. Among the contagious diseases which prevailed are the following: Whooping-cough, scarlet fever, diphtheria and chicken-pox. Ten cases of puerperal fever occurred in the practice of one physician at Parsippany, which he believed was due to contagion. Morristown and vicinity were visited by a mild epidemic of conjunctivitis.

FOR THE YEAR ENDING JUNE, 1882.

The report states that the usual amount of malarial disease occurred during the year; also a few cases of scattered typhoid were observed through the county. At Middle Valley there were a number of cases. Four of these cases occurred simultaneously among people engaged in the removal and renovation of an old house. It was thought that the upturning and exposure of soil saturated for years by kitchen slops and waste was the cause of the disease in this instance.

Scarlet fever of a malignant type, frequently complicated with diphtheria, prevailed at Bloomingdale, Dover and Mine Hill. Rotheln was epidemic, as well as chicken-pox and whooping-cough.

FOR THE YEAR ENDING JUNE, 1883.

Freer from malarial fevers than for years. Influenza of a severe character has been epidemic at Morristown, Chester, Dover, Parsippany and Middle Valley. Scarlet fever and mumps were epidemic at German Valley and Parsippany.

Of typhoid fever only a few cases were met with outside of Bloomingdale.

FOR THE YEAR ENDING JUNE, 1884.

Scarlet fever and diphtheria were met with to a limited extent. Measles and whooping-cough were epidemic in Bloomingdale. Malaria not so frequent.

FOR THE YEAR ENDING JUNE, 1885.

A diminished tendency to malarial fevers. Scarlet fever was encountered in every part of the county. Measles and mumps were epidemic in Boonton and Morristown. Three malignant cases of diphtheria reported from Boonton, brought from Newark, and all died. This dreaded disease was nowhere epidemic in the county.

OCEAN COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

No epidemic has been met with except diphtheria in two limited localities, in one of which it was very malignant, and confined to a small section of county, in and about Point Pleasant. The other was of scarlet fever, confined to the small village of Waretown, on Barnegat Bay.

FOR THE YEAR ENDING JUNE, 1881.

Diphtheria made its appearance in May, about the time when the burning of charcoal ceased. The reporter remarks, "That it seems to be a fact that while the coaling business is in progress there is very little sickness. It is noticed that as the burning of charcoal commenced in August diphtheria ceased."

FOR THE YEAR ENDING JUNE, 1882.

Typhoid fever prevailed to an unusual extent during the latter part of summer and throughout the autumn. Malarial fever, from which this county has been heretofore almost wholly free, attacked a considerable number of workmen engaged in the construction of a railroad from Whitings to Point Pleasant. Diphtheria appeared sporadically throughout the fall and early winter. In January an epidemic of influenza raged. One or two cases of small-pox were reported in a remote part of the county.

FOR THE YEAR ENDING JUNE, 1884.

Less typhoid fever than previous years. A mild epidemic of diphtheria occurred at Cedar Run. Scarlet fever and whooping-cough were uncommon. Mumps were epidemic in some sections and measles everywhere.

FOR THE YEAR ENDING JUNE, 1885.

Measles prevailed with great severity, and influenza with sore throats of different kinds were quite common. Diphtheria appeared in a few scattered instances. Typhoid fever was also frequently seen.

PASSAIC COUNTY.

FOR THE YEAR ENDING JUNE, 1879.

Malarial fevers have prevailed to an unusual extent throughout the year, and have shown themselves on the mountains, where they have never been experienced before. Erysipelas of the head and face, during the early spring months, has been endemic. The county has been generally free from epidemics. There have been but few cases of diphtheria. In the south part of Paterson scarlet fever, of a severe type, prevailed, a large number of cases being complicated with diphtheria. Diseases of the air passages, as influenza, were epidemic.

FOR THE YEAR ENDING JUNE, 1881.

There has been less malarial fever than usual. There were several cases of small-pox in the spring. Vaccination was generally performed and the cases successfully quarantined.

FOR THE YEAR ENDING JUNE, 1882.

Malarial fevers much less than last year. Dysentery prevailed in Paterson, and was traceable to contaminated well-water. A few cases of small-pox occurred in Passaic City, and measles were epidemic. Scarlet fever assumed the character of an epidemic in Paterson during the winter and spring. Only a few cases of diphtheria are reported from any parts of the county.

FOR THE YEAR ENDING JUNE, 1883.

Malaria less prevalent than in former years. Scarlet fever was less frequently met with than formerly. Paterson reports an epidemic of small-pox—187 cases in all. A few cases of the same disease are reported from Passaic City.

FOR THE YEAR ENDING JUNE, 1884.

Less than the usual amount of malarial fevers. Typhoid fever occurred throughout the year. Public wells are believed to be the cause. Measles were epidemic. It was thought there were fewer cases of diphtheria than usual.

FOR THE YEAR ENDING JUNE, 1885.

Malarial fevers have been less common than in former years. Typhoid fever was less prevalent. The reporter speaks of four cases in one family, in which the disease was obviously caused by impure drinking-water. Diphtheria was not severe. Scarlet fever, measles and whooping-cough of mild type. Influenza very prevalent.

SALEM COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Measles very prevalent in many parts of the county. Scarlet fever prevailed among the colored population in the outskirts of the city of Salem. Diphtheria was prevalent in some localities, and frequently fatal. Intermittent, remittent and typho-malarial fevers prevailed to a moderate degree. The latter disease has become endemic to such parts of the county as border on the Delaware and its tributaries. Genuine typhoid fever is a rare disease in this county.

FOR THE YEAR ENDING JUNE, 1880.

No epidemic has occurred, nor have endemic diseases appeared, as in former years.

FOR THE YEAR ENDING JUNE, 1881.

Has enjoyed an unusual immunity from epidemic diseases. There have been mild cases of measles and scarlet fever.

FOR THE YEAR ENDING JUNE, 1882.

An increase of malarial fevers. Scarlet fever and measles quite prevalent; also a few sporadic cases of diphtheria. It was supposed that the increase in malarial fever and the severity of it was in part caused by the remarkable drought which prevailed during the summer and autumn.

FOR THE YEAR ENDING JUNE, 1884.

There was a general decline of malarial fever throughout the county. A considerable number of cases of mumps and measles were met with in every section. Diphtheria and scarlet fever were rare.

FOR THE YEAR ENDING JUNE, 1885.

No epidemics have occurred. A few cases only of scarlet fever. Mumps and measles were casually noticed. Malarial fevers prevailed only to a limited extent.

SOMERSET COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

Fewer cases of typhoid fever and diphtheria than formerly, with a general prevalence of catarrhal affections, such as influenza.

FOR THE YEAR ENDING JUNE, 1879.

In Raritan an epidemic of diphtheria appeared, of a malignant type. The reporter estimates that there were about one hundred and fifty cases, with a mortality of twenty-five per cent. The disease occurred mostly in children of families employed in a mill, who lived in small tenement-houses, each containing three or four families.

The surface of the ground is flat, without drainage, and all the surroundings were adapted to generate the disease.

FOR THE YEAR ENDING JUNE, 1880.

In former years this county has been distinguished for its freedom from malaria, but is now compelled to regard it more and more as an abiding pest. The same is stated this year as last. It occurs in localities well drained, free from marsh, and without changes in soil. (See the causes of this as developed in the Bound Brook trial.)

FOR THE YEAR ENDING JUNE, 1881.

A bold and decided increase of malaria, and a decline of typhoid fever. An epidemic of measles of a severe form, with sore throat, abounded. At North Plainfield an outbreak of small-pox was circumscribed by vaccination, &c.

FOR THE YEAR ENDING JUNE, 1882.

A decline in malarial fevers, although an increase in the number of cases is reported from Somerville and Raritan. Typhoid fever occurred at Neshanic, severe in form.

All cases were believed to have been caused by a heap of refuse from a fruit-preserving factory. Also a few cases of typhoid were observed in Harlingen, traceable to local causes. Measles prevailed generally throughout the county. Only a few cases of small-pox were under treatment, and vaccination has been very general.

FOR THE YEAR ENDING JUNE, 1883.

Less malarial fevers than in several years preceding. Diphtheria has prevailed to some extent. An epidemic of pleuro-pneumonia visited various parts of the county, and caused the deaths of about twenty per cent. of those attacked.

FOR THE YEAR ENDING JUNE, 1884.

Has been free from diseases of an epidemic form. There have been sporadic cases of diphtheria and typhoid fever.

FOR THE YEAR ENDING JUNE, 1885.

No epidemics and not as much malarial fever as formerly.

SUSSEX COUNTY.

FOR THE YEAR ENDING JUNE, 1879.

Slight increase in malarial fevers. Diphtheria has appeared in several localities, but the cases have been generally isolated—some of them very malignant. A number of cases of typhoid fever and scarlatina have been reported, most of which have occurred in the town of Newton.

FOR THE YEAR ENDING JUNE, 1881.

A large amount of intermittent fever, and the malarial influence seemed to characterize other diseases.

FOR THE YEAR ENDING JUNE, 1882.

Malaria has prevailed to a limited extent. The Board of Health investigated the cause of three cases of typhoid fever at a farm-house, and traced the poison to a covered drain leading from the house.

FOR THE YEAR ENDING JUNE, 1883.

Malarial fevers in their various types prevailed to a greater extent than formerly, and made their appearance in sections where it had never been known before.

Measles, complicated with bronchitis, are reported from Vernon only, and scarlet fever prevailed only in Hamburgh.

FOR THE YEAR ENDING JUNE, 1884.

There were no epidemics reported; some malaria in Walpack township.

FOR THE YEAR ENDING JUNE, 1885.

Malarial fever prevailed, although milder in form and to a less extent.

UNION COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

In Rahway there was a low type of continued fever. In Elizabethport diphtheria and scarlet fever prevailed.

FOR THE YEAR ENDING JUNE, 1879.

Malarial fevers have prevailed, and of an extremely obstinate character. Diphtheria and scarlet fever have been endemic, but not as prevalent as last year.

FOR THE YEAR ENDING JUNE, 1880.

Few cases of malignant scarlet fever. Plainfield reports five cases of small-pox. They were carefully isolated, and not a single case of contagion resulted. Rahway also reports ten cases of small-pox, with four deaths. Malaria, however, claims the largest share of influence, as the chief factor of disease in Union county.

FOR THE YEAR ENDING JUNE, 1882.

An epidemic of measles at Plainfield, which was unusually severe, and several deaths occurred.

FOR THE YEAR ENDING JUNE, 1883.

Scarlet fever of a severe type prevalent in Elizabeth and Rahway. Measles and whooping-cough epidemic at Plainfield and Rahway. Of diphtheria only a few scattered cases, and the same is remarked of typhoid fever. Malarial fevers were less frequent than in former years.

FOR THE YEAR ENDING JUNE, 1884.

No contagious diseases except scarlet fever and measles. A few cases of diphtheria were reported in Cranford township, supposed to be caused by children occupying a new school-house that had been freshly plastered—twenty cases in all; one died. The school-house was vacated for one month, and thoroughly dried.

FOR THE YEAR ENDING JUNE, 1885.

Enjoyed a year of good health, except in the township of Fanwood, where scarlet fever prevailed epidemically, and of a grave type. Many deaths occurred—probably one-third of all attacked.

WARREN COUNTY.

FOR THE YEAR ENDING JUNE, 1878.

An epidemic of typho-malarial-fever in Stewartville and vicinity, which lasted for four months. Also an unusual prevalence of malarial fever in the Musconetcong valley above Hackettstown, and at the head-waters of the Pequest. The neighborhood of Johnsonsburgh was also badly affected.

FOR THE YEAR ENDING JUNE, 1879.

Malarial fevers have prevailed to some extent in different portions of the county, and influenza has been general. Diphtheria, of a malignant form, in the upper part of the county, and scarlatina, with some diphtheria, in Phillipsburg and Knowlton.

FOR THE YEAR ENDING JUNE, 1880.

Scarlet fever and diphtheria were endemic for a short time in Phillipsburg, in a part of the town with unfavorable sanitary surroundings. Malarial fevers are noticed by the reporter as very prevalent in some of the towns, and in others they have been of average extent.

FOR THE YEAR ENDING JUNE, 1881.

Malarial fever in the autumn, which, in many cases, proved fatal. Influenza was epidemic in the spring. Measles and diphtheria were quite prevalent in some portions.

FOR THE YEAR ENDING JUNE, 1882.

The county of Warren has suffered to an unusual degree from periodical and continued fevers, and from diphtheria, in and around Phillipsburg. Scarlet fever, of a malignant form, prevailed in Washington, and several cases of small-pox. At Oxford thirty-five cases of small-pox occurred, and seven deaths. During the fall and winter scarlet fever was also prevalent in this township. There were several deaths from scarlet fever and measles in Belvidere. There were much less malarial fevers than in former years.

FOR THE YEAR ENDING JUNE, 1883.

Malaria still prevails in all parts of the county, and in some places typho-malarial fever has occurred. Only a few cases of typhoid fever reported. Hackettstown reports a visitation of scarlet fever of an exceptionably fatal type. Frelinghuysen township reports scarlet fever as epidemic, and a few cases of rotheln are noted. In Phillipsburg an epidemic of mumps prevailed, affecting adults as well as children.

FOR THE YEAR ENDING JUNE, 1884.

Exempt from any distinctly prevalent diseases. Malaria has predominated. Scarlet fever has prevailed in some sections of a mild form. Also whooping-cough and measles.

The Chairman of the Standing Committee, in his review of the State for the year, says: "A summary of the medical history of the year is as follows:

"1. A diminished amount of sickness throughout the State.

"2. Epidemics have not prevailed to any great extent, and of diminished intensity.

"3. Less contagious diseases, except measles, which were unusually prevalent.

"4. Fevers of a malarial character less frequent, and typhoid fever less fatal."

FOR THE YEAR ENDING JUNE, 1885.

While whooping-cough, measles, and a mild form of scarlet fever have all occurred to a moderate extent, the district has been favored in its freedom from disease of a malignant form.

CLOSING REMARKS.

Little more than a quarter of a century has elapsed since efforts have been made to improve the sanitary condition of the people. But short as the period has been, much good has been done. Many lives have been saved and much sickness and misery have been averted. Dr. Johnson says: "To preserve health is a moral and religious duty, for health is the basis of all social virtues." Indeed, it is only within the past ten years that sanitary science has made its way, in any important degree, outside of purely professional men and professional literature. There is a growing conviction that the necessity for such knowledge is not restricted to the physician; that it is essential also to the educator, the architect, the engineer, the mother, the nurse, and, indeed, to every one who would enjoy, together with the due development of his physical, intellectual and moral nature, the full boon of life. Happily, men, and women, too, are fast coming to realize the fact that humanity is responsible for much of its own sickness and premature death.

The main causes which shorten and embitter human life, as far as that unhappy result depends on the disturbance of health, are within our own control. There is the closest connection between the knowledge we have acquired of the physical conditions on which the life and health of individuals and communities depend, and our command over those conditions. Every fact we have learned respecting the great laws of nature, on our conformity to which our very existence depends, has taught us that the circumstances which produce excessive sickness and early death are preventable.

The character of pestilence which gave it its great power and terror—"that it walketh in darkness"—is its character no longer. Its veil has fallen and with it its strength. A clear and steady light now marks its course from its commencement to its end; and that light places in equally broad and strong relief its antagonist and conqueror, sanitary science, and through it the prompt adaptation and adoption of preventable means. The spread of epidemic disease is always the direct result of neglecting sanitary laws. There is now no mystery about the Plymouth fever, and many more epidemics we might mention. They are as plain and clear as the death of a man who has been seen to swallow a dose of strychnine. Now that we know the causes, such as overcrowding, for example, we can prevent the accumulation of filth in towns and houses. We can prevent the spread of conta-

gious diseases. The supply of light, air, and pure water, together with several other appliances included in the all-comprehensive word cleanliness, we can secure. To the extent to which it is in our power to do this, it is in our power to prevent disease and epidemics. The human family have now lived together in communities for over six thousand years, and they have not yet learned to make their habitations clean. At last, however, we are beginning to learn the lesson. When we shall have mastered it we shall have conquered epidemics.

Let us, therefore, look hopefully forward for the time to arrive when we can show the ability of sanitary science to vastly reduce mortality from future epidemics.

English sanitarians claim that more lives have been saved in their army in ten years by better observance of sanitary laws than were lost at Waterloo.

The death-rate could certainly be reduced in every part of our nation by efficient national, State and local sanitary supervision. In the English official reports we find that such a system reduced the annual death-rate from 22.6, in 1872, to 18.9, in 1881; and that this reduction was not spasmodic, nor due to exceptional causes, but was steadily continued from year to year, and the reduction gradually accomplished during the ten years. In other words, thirty-seven persons in every thousand were saved from death each year during the period mentioned, who would most certainly have died had it not been for this careful sanitary oversight. This statement shows what has been accomplished there, and no reason exists why as good results may not be attained here. Taking our figures from our own annual reports for five years, from 1879 to 1883 inclusive, we find that 29,843 persons died in this State from causes that might have been avoided. This shows us that an average of 5,968 persons died in this State from preventable diseases each year during that period, many of whom might have been living to-day under a proper sanitary oversight at all equal to that now in practical operation in England. In other words, more than five people in every thousand die annually in this State from avoidable causes.

In closing this report we desire to call special attention to—

First. The importance assigned to hygiene and State medicine all over the State of New Jersey. The increasing interest and attention given to it, is an evidence at once of the advanced stage of civilization and of the dense and rapidly-growing population. It also indicates

that long occupancy of the land by successive generations has at length overtaxed the regenerative and self-purifying energies of the earth, and that extraordinary methods have now become necessary.

Second. To the fact that preventive medicine has at last attained recognition as the highest aim of the physician's art. It has now more to do than in warding off epidemic visitations of great scourges.

The late Dr. Samuel D. Gross, closed his oration delivered at the dedication of McDowell's Monument, in the following significant words:

"Young men of America: listen to the voice of one who has grown old in his profession, and who will probably never address you again, as he utters a parting word of advice.

"The great question of the day is not this operation or that, not ovariotomy or lithotomy, or a hip-joint amputation, which have reflected so much glory upon American medicine—but preventive medicine, the hygiene of our persons, our dwellings, our streets—in a word, our surroundings, whatever or wherever they may be, whether in city, town, hamlet or country, and the establishment of efficient town and State Boards of Health, through whose agency we shall be more able to prevent the origin and fatal effects of what are known as the zymotic or preventable diseases, which carry so much woe and sorrow into our families, and often sweep like hurricanes over the earth, destroying millions of human lives in an incredibly short time.

"The day has arrived when the people must be roused to a deeper and more earnest sense of the people's welfare, and suitable measures adopted for the protection, as well as for the better development, of their physical, moral and intellectual powers.

"This is the great problem of the day, the question which you, as the representatives of the rising generation of physicians, should urge, in season and out of season, upon the attention of your fellow-citizens, the question which above and beyond all others should engage your most serious thoughts, and elicit your most earnest co-operation.

"When this great object shall be attained; when man shall be able to prevent disease, and to reach, with little or no suffering, his three score years and ten, so graphically described by the Psalmist, then, and not until then, will the world be a paradise."

LOCAL OUTBREAKS OF TYPHOID FEVER

AT CAPE MAY COUNTY AND THE MORRIS PLAINS ASYLUM.

THE SEWER SYSTEM OF THE ASYLUM.

Besides the cases of typhoid fever which have occurred in various parts of the State, there have been two local outbreaks, the history of which it is important to record. Our attention was called to the first in April, 1885, on account of its spread in the small neighborhood of Swainstown, in Cape May county. The following is its brief history, as obtained from Drs. Mecray and Marcy, of Cape May, and as confirmed by my own visit and examination:

The first case occurred on the 11th of September, 1884, in the family of Mr. N., at Holly Beach. The child recovered. The B. family were living in the adjoining house, and frequent visitors to the sick child. Both families used the same surface well, which had been filled up before the visit of a sanitary inspector. Mrs. B. was taken about the 18th of October, and some days after removed to Swainstown, several miles distant, where she died the next day after arrival, from severe intestinal hemorrhage.

There were two other cases at Holly Beach, both of which recovered. Holly Beach is low and quite level, and water, after rains, stands in pools. The springs are near the top of the ground, and you can dip water out of most of the wells. Water in the wells often becomes unfit for use, and persons are changing wells continually. All the privies are simply deposits upon the ground, and so these may easily find their way into the water. Since these cases, a Health Board has gone vigorously to work to correct evils. About ten days after the death of Mrs. B., who had been brought from Holly Beach to Swainstown, her husband was taken sick. He had a severe attack. His attack lasted about four weeks.

"During his sickness a little girl of a neighbor was sent daily to the

house to inquire after him, and always, childlike, went up to the sick-room, remaining from half an hour to two hours. In about nine days the child sickened, and after about two weeks more, died, with some brain complication. This brought it up to about the last of December. It then remained quiescent until some time in February, when a Mr. I. took his little son, about nine or ten years of age, and went with him to Holly Beach, and remained there two days and one night in the immediate vicinity, if not in the house where the first case originated. In about nine days after their return home the child sickened, and ran through a tolerably severe course and recovered. In about a week the mother of the child sickened, and during the third week died. This case occurred in the midst of the cluster of houses visited. Mrs. I. was the daughter of Capt. E. B., and a very intimate friend of the H. family. Of course, the whole B. family were more or less with the sick ones, and the H. family, also. Special sanitary precautions were not used in these two cases, and the cases that you saw, and that were on hand at that time, were infected so that I soon had eight of them, all down at one time. The fever was plainly typhoid, as you saw. Their temperatures ranging from 102° to 104°; part of them (four) had the typhoid eruption; six of them had bad diarrhea; five of them dry, dark tongues; six of them deafness, and a pulse-rate with them all, from ninety-six to one hundred and twenty. Those that had the eruption had some soreness over the right iliac region; six had delirium, more or less. Four have died; one from perforation of bowels, as you know. The Miss H. that suffered the relapse, died from exhaustion, at the end of the sixth week, and the second week of the relapse; the other one, with epistaxis, with hemorrhage from stomach and bowels. The remaining four of them are fairly convalescent. I have no doubt now, but that the outburst that fell to my hands was caused by infection, and for the want of proper use of disinfectants in the case of the child mentioned."

Two other cases have since occurred which can probably be traced to the same source, although one of them was full three weeks after nursing in one of the families.

The Secretary of the State Board made a thorough examination for local causes of the disease at Swainstown. Although the wells were not deep, there seemed to be unusual care as to them. The testimony was decided on the part of physicians and nurses and

families, that there had been no opportunity for the contamination of water. Those who visited, and those who took meals in the house, suffered. Because no access could be had to the original well, the evidence of contamination was incomplete. But the history of all the cases shows how insidiously the disease may creep on from one person to another. There are many who believe it can be directly communicated by air, as well as by water or milk, as also by air settling on or blowing over food kept or eaten in the house.

The disease seemed to limit itself after all details of disinfection were thoroughly applied. It is the frequent experience of health officers to find that in first cases no thorough methods of control over discharges, surroundings, etc., are exercised, or that when disinfection is ordered, it is very imperfectly done. He is the successful physician in limiting typhoid fever, as well as in treating it, who, from the first, takes thorough charge of all details and sees to it that they are rigorously carried out.

To tell people to disinfect will not do. At the first the physician or the sanitary inspector must do it, and then see that the plan is accurately carried out.

OUTLINE AS TO TYPHOID FEVER IN MORRIS PLAINS ASYLUM.

On the second and third of July, 1885, two persons in the institution were taken sick with what proved to be typhoid fever. Between the ninth and fifteenth of the month, three other cases occurred. Up to the date of September 3d, there were in all seventeen cases and three deaths. The diagnosis of the disease as typhoid fever was verified by a post mortem examination had September 1st. Of the first seven cases, six were attendants, although the number of attendants was small, compared with the eight hundred and sixty inmates. The first cases, and, indeed, all but one of the cases up to September 7th, occurred in the portion of the building north of the center or administrative portion.

The chief things first to be accounted for, are the origin of the disease—the reason of its outbreak and prevalence in one part of the buildings, and of its preference in attack for attendants instead of patients.

It was first of all proper to seek for an outside origin. It is absolutely necessary to do this, if we hold to the view of those who claim

that it never arises *de novo*, but is only fostered and made worse by imperfect insanitary conditions. Also those who believe that it occasionally occurs only from local conditions, recognize that it is frequently derived from antecedent cases, and that inquiry is always to be made for outside sources.

It is in evidence that a case of typhoid fever occurred in the institution November 29th, 1884.

The only connection of this case with those in July, which has been suggested, is that the material passed into the general sewer system and may have gotten into the building because of circumstances hereafter to be described.

It is also in evidence, that the wife of the engineer, who lives in one of the farm buildings several hundred yards from the premises, was taken with typhoid fever June 21st, 1885.

The buildings, water, etc., are so entirely separate that no connection could be established. The milk-supply was the same for the northern as the southern wings of the building. The water-supply was also the same. An examination of the water, while showing it contaminated with some vegetable matter, did not show anything to lead to suspicion of it as a cause of the endemic.

An interview with the only person who was sick, who had at all recently come into the institution, seemed to show that he had had no exposure to sickness of any kind within a few weeks previous to his entrance.

The employe who was taken July 3d, and recovered, had come on duty early in June. He states that a few days after he was in the ward, (2–4,) he noticed odors and spoke to another attendant as to them. This attendant (Mr. Grey) said that he had noticed odors at that time from all the closets under his supervision. It seems to be admitted that occasional odors had occurred before this, and that the exhaust system, on which the closets depended, had been complained of. The steward, Mr. Monroe, states that himself and the engineer, some time in February, had been called over to this part of the building to look after the cause of some odors complained of.

It seems to be agreed that this wing had given more trouble as to its purity of air than any other part of the institution, and that in June it was especially disturbed. Nothing in the character of the patients of the second ward could account for this. The first four patients, July 2d to 13th, were in adjoining rooms, and two of them

in one room. It seems to have been known that in the extremities of the building the action of the exhaust system of ventilation was not entirely satisfactory. Just at this time the general force of the exhaust, pertaining to the north building, was diminished by repairs which were being made, and which made it necessary to reduce the power around the smoke-stack. This would naturally affect the more remote parts of the system more than those adjacent. But why the north wing more than the south? One accounts for it by claiming that the sewer gases were never sufficiently diluted or oxidized to make it proper to trust to anything less than an acutal burning in the inner smoke-stack, and that thus coming out at the top the prevailing southerly winds caused the foul air to settle, and so "not only induced the sickness reported, but has also predisposed scores if not hundreds to similar attacks."

Another explanation is, that the *terminus of the north part of the sewer system* was not sealed as is that of the south part, and that the open pipes which were so near the discharge-tanks or beds of sewage would suck up into the northern wing of the building the air which would not be drawn out to the smoke-stack, but here find its first exit through the water-closets.

When the outside opening was discovered, in July, it was at once boarded up. This was a natural and easy mode of entrance. There is abundant evidence that the odors arising from these successive open cesspools, were the gases and particles of continuous decomposition.

Supposing, as we do, that the sewer system of the institution, and the method of disposal of the sewage outside of the institution, had to do with the prevalent sickness, and that it is now a menace to the health of the institution, it is necessary briefly to describe it.

DESCRIPTION OF THE SEWERS AND SEWAGE DISPOSAL.

It is the application of the principle of exhaust ventilation, as used for buildings and shafts of mines, to the ventilation of sewers. In its application to buildings and to mines it has generally been found necessary to depend upon some form of revolving and aspirating fan moving with great velocity, in order to maintain a constancy of vacuum. While heat is an exhaust, where it is derived from fires varying different days and at different seasons and with varying winds, it has been found that as thus furnished it cannot be uniformly

depended upon. When such a system comes to be applied to a series of pipes, so vast in extent, with so many variations of size, of angle, and of direction, with such friction of surfaces, with streams of water varying in size, rapidity and temperature moving in other directions, and with the interference which such rushing of cold air into the smoke-stack causes, the problem is a deeply-involved one.

We quote the following memoranda as to it from various skilled authorities:

"The ventilation of soil pipes by 'aspiration' or 'propulsion,' is experimental in its character, unreliable and opposed by most sanitary authorities."—*Maclay & Davis, New York City.*

"Furnaces, blowers, exhaust-fans and other mechanical apparatus for exhausting the air in sewers or forcing fresh air into them, are expedients which suggest themselves to those ignorant of the construction of sewers and the operations going on within them. They have all been tried with extreme care and have failed utterly."—*James C. Bayles.*

"The ventilation of a coal mine by shafts is simple because the air gets down in the way, and only at the time the engineer intends, and because it does not require to be either warmed or cooled. In the fixtures of buildings and the various inlets of air at varying temperatures, the air is constantly entering just in a way to disturb the system, and either to reverse the currents or greatly diminish them."

"It has repeatedly been proposed to utilize the heat of the kitchen chimney for the ventilation of soil pipes by running these from above the highest fixtures into such heated flues. Such practice is not permissible under any circumstances whatever, for there are, at times, down draughts which would force soil-pipe air into the house."—*Gerhard.*

About seven years ago a somewhat similar system was tried at the Massachusetts Asylum for the Insane, at Danvers, Mass.

The conditions of success were: "A slight degree of vacuum, or diminished air pressure throughout the house drain pipes, to be attained by an up-cast shaft connected with the drain at its lower end and kept constantly heated by artificial means, for the purpose of maintaining a constant resultant inward pressure at every opening or leak in the drain system throughout the house, and a constant draft of air through the whole from the remote extremities, which are left open to the air as inlets."

The friction encountered by air in moving through considerable lengths of drain pipe is so great that the nearer inlets will have a far greater capacity for supplying air in proportion to their size than the more remote ones.

This difficulty was so great in the case of the Danvers Asylum, above referred to, where a steam boiler chimney was used as an up-cast shaft, that many of the inlets had to be closed after trial, before the draft was found sufficient at the extremities of the system.

The *Sanitary Engineer* refers to the utter failure of this method of ventilation in another institution, the Rhode Island State Hospital:

"It depended for its aspiration upon the main chimney stack of the establishment, 109 feet high, kept warm by boiler fires which are maintained throughout the year, and which, for more than half the time, perhaps for more than three hundred days in the year, create an inward draft at all the water-closets and lavatory-sinks in the building. Such was the case when the hospital was inspected by the writer, about two months since. But the officers in charge, as well as the trustees, all agree that for some unexplained cause this draft fails entirely in parts of the building on certain days, depending apparently on the direction of the wind. At such times some of the water-closets persist in sending forth into the adjoining wards a most insufferable odor, having no inward draft whatever, but a most decided outward one, showing the whole system to be altogether unreliable and mischievous. Now this building is one of the most favorable that it is possible to imagine for the success of the system. It is isolated, and not under a hill. The lofty chimney stack towers above the highest part of the roof, and is constantly used for steam boiler fires, which are kept up all summer for supplying steam to the kitchen and laundry, as well as for nurses cooking. 'Moreover, the arrangement of drain pipes was carefully studied and to all appearances faithfully executed.'

Reports of experiments of like nature abroad, where the ventilation of town sewers is assisted by means of connections being made with factory or mill chimney shafts, give very indifferent results.

At Bradford, the one connection in the town is only effectual for about 100 yards; in Carlisle, to a radius of 400 yards; in Cardiff, the effect is limited to the immediate vicinity; in Glasgow, no effect is produced beyond the nearest grate admitting air, etc., etc. While better results are reported from Hartlepool, Reading and Middlesborough, the connections cause no effect at a distance of 100 yards at Southport, and in Greenock one connected as an experiment has been

discontinued, the influence not being felt beyond a distance of 200 yards.

A committee of three members of the Board expressed the opinion that all openings of closets, sinks, urinals, etc., in the building should be trapped, and that the question of whether any part of the exhaust system should be retained, ought to be submitted to a mechanical engineer, who, by accurate data and experiment, can find what its power and reliability is.

Because of the needlessness of rain-water, as at present distributed and applied for flushing purposes, and because of the great complication it adds to methods for ultimate sewage disposal, we recommend that it be separated from its present method of disposal into the sewers.

This Board, while cautious as to recommendations, has made formal suggestions to the Board of Managers, and requested that they be further tested by reference to skilled engineers.

We now pass to consider the method of disposal of sewage, and the reasons why some change must be made. The sewage passes out of the pipes, one on each side of the building, and at their ends is discharged into an open pond or cesspool, twelve feet by thirty feet in extent and four or five feet deep. Of these there are eight or nine so arranged that in each some scum can be raked off from the top and some of the decayable matter be allowed to settle to the bottom, and then the water pass out by a leader or trough a half mile long and be distributed from its sides by means of holes and pegs, the holes being opened or stopped alternately, so as to regulate the places at which the liquid is to be discharged on the ground. We first saw these open ponds at the request of the Morristown Board of Health. They were merely ponds, or open cesspools, from which, in a crude and unpleasant way, floating materials could be raked off and mixed in a poor compost with ashes we saw upon the banks, and also places where some of the heavier and cruder matters would settle, until there was so much nauseous stuff as to require the letting off of the water in order to remove it and mix it with ashes, earth, etc. One of the beds was in this condition when the Secretary first saw it, and he at once expressed his entire want of confidence in any such method of dealing with the sewage of the institution.

Two years after, when the Board was called by the Board of Managers to view it with some claimed improvements, in a letter

addressed to the Managers, Messrs. Brackett, Leeds, Osborne and the Secretary united in saying "it is fortunate that we are all in agreement that the present method is unsatisfactory." We did not, at that time, technically examine the house system, but accepted testimony as to it, but we did examine the system of disposal of sewage and condemn it, and specifically proposed the substitution of another method. We heard nothing of the result until we read as follows in the report of the Managers to the next Legislature: "It was finally decided that, in view of all the facts and circumstances requiring attention, that the principle of broad-surface irrigation, as recommended by the author of the report, together with his method for accomplishing it, be tried," etc. This merely meant that precisely the same method was to be continued, with an extension of these surface troughs. The problem was: given 150,000 gallons per day, with a rain-fall of seventeen gallons a year to every square foot of three acres of roof, to be disposed of whenever supplied by means of some open cesspools for raking and settling, the water (still foul, as chemical examination always showed,) to be distributed over wet, untilled land, near woods. It was as if a thousand barrels had been filled each day with sewage-water drained off from tanks and then set in a row, and the taps pulled on intermediate days, so that the water could flow over wet, low and untilled lands. This is, in no sense, the system usually known as broad-surface irrigation. It has been examined by several skilled Sanitary Engineers, but no one has yet been found to approve it. So far as it was for a time available, the credit must be given to the personal watchfulness and administration of the former Superintendent, and not to the crude construction and distribution.

When we met with the Managers, in 1883, we advised the substitution of a system of chemical precipitation, and suggested a further conference, in order that all details might be perfected. This was rendered unnecessary on the acceptance of the above plan. We still believe a precipitant method possible, but, because of increased ownership of lands and some other considerations, have now recommended the small pipe and flush tank system, by which intermediate irrigation and filtration is applied a few inches below the surface of the ground. In a communication made to the Managers, we have outlined the method of its accomplishment, and advised the employment of some skilled engineer.

DISTRICT SANITARY INSPECTION.

BY HENRY MITCHELL, M.D., DISTRICT INSPECTOR.

In accordance with "An act to provide for the better care and protection of the public health," approved April 21st, 1885, eight Sanitary Inspectors were appointed by the State Board of Health. The purpose of the Legislature and the object of the State Board of Health in creating these officers, was stated in a circular issued May 15th, 1885, to be as follows:

I. To thus have persons ready at hand who are familiar with the health laws of the State and with the details of their administration, so as to advise with and direct local Boards of Health in their work.

II. To see that proper organization of Health Boards is perfected where it has been omitted, or the plans therefor are not understood.

III. In case of sudden outbreaks of disease, at once to render such assistance as may be indicated or as local Boards may desire.

IV. To secure or aid in the sanitary inspection of schools, almshouses, jails or other places of public assembly or detention.

V. To secure a more general vaccination and a knowledge of the methods of preventing communicable diseases.

VI. To aid local Boards in the enforcement of the laws as to vital statistics, as to adulteration of foods or drinks, as to dangerous kerosene, and as to the contagious diseases of animals, etc.

The past few years have shown that, notwithstanding all needful authority has been delegated to local Health Boards to enable them to successfully protect the public health against preventable dangers, yet many of the benefits obtainable under the statutes are not enjoyed by the public. This fact will not appear surprising when it is remembered that few of the persons who are now serving as members of Health Boards, or acting as health officers, have given the subject any attention until within the last four or five

years, and that only the first principles of the application of the established laws of health are thus far generally understood or practiced.

The District Sanitary Inspectors were expected to co-operate with local Boards, to assist them whenever it seemed desirable in determining what constitute dangers to health, and to point out the appropriate course to be pursued in given cases in applying the remedies provided for in the laws. Moreover, in case a serious and extensive epidemic should prevail in the country, or within the State, the District Inspectors would be the persons mainly depended upon to speedily and intelligently put in operation the methods necessary to effect its control and suppression, and to carry out the directions of the State Board of Health.

As local Boards are at present constituted—none except a few ex-officio members receiving compensation, or having been selected because of their attainments as sanitarians—there is little reason to suppose that they will at once give requisite time to the study of public hygiene. But the experience of the past year shows that they are stimulated and encouraged by occasional visits from a capable officer, who, by advice and example, demonstrates the advantages and illustrates approved methods in the correction of unsanitary conditions. It is only by skilled guidance that those charged with local sanitary administration can make satisfactory progress in executing the laws, and avoid the discouraging entanglements which attend ill-directed efforts to accomplish very desirable ends.

In rural districts the Inspectors have found few instances where any effort is made to anticipate health dangers. Members of the town committees, who, together with the assessor and township physician, compose township Boards of Health, are generally disinclined to expend sufficient money to obtain the services of an Inspector, and until recently the township physician has usually done whatever has been accomplished in the inspection of premises. The act requiring township Boards to appoint Inspectors has been voluntarily conformed to in some cases at the instance of District Inspectors, but these useful and necessary officers are generally employed only for a portion of each year, and their service is thereby rendered less valuable than it would be if they were constantly engaged in their labors. Without a Health Inspector who is always informed in regard to the sanitary conditions on all premises in his district, no

township Board can bring the healthfulness of the territory under its supervision up to its normal standard.

The District Inspectors find that reports of communicable diseases are not generally required outside of incorporated districts, and that suitable care is not taken to prevent the spread of such diseases, many lives being annually sacrificed in consequence of this neglect.

The following review of the reports of the District Inspectors will indicate the scope and nature of their labors:

In Middlesex county local Boards were aided in framing ordinances, classifying nuisances and in suggesting methods of procedure.

In Camden county the Inspector investigated sanitary defects of premises and suggested remedies. Health Boards were formed in ten districts which had hitherto failed to avail themselves of the privileges of the laws.

In Atlantic county an outbreak of typhoid fever was investigated, and the organization of local Boards perfected.

Inspection of a portion of Hudson county shows that some parts of Jersey City are in a deplorable condition. The residents are subjected to the evils resulting from continual neglect in the sanitary oversight. Overcrowding among the poorer classes; filthy accumulations of rags, bones and vegetable matter in yards and cellars; low-lying streets being filled with mixed ashes and garbage; public sewers discharging upon the surface of the ground—all contribute toward keeping up the abnormal death-rate. Thus far no adequate measures have been taken to improve unsanitary conditions in Hudson county.

In Mercer county an inspection of the village of Hightstown shows that local sanitary administration has been inefficient. It is found that in this locality, as in many others throughout the State, the drinking-water obtained from wells is not properly protected. Cesspools and wells are commonly situated too near each other for safety.

A partial inspection of the passenger stations of the railways of the State has been made, and in numerous instances serious faults in the construction of vaults and drains were observed. Appropriate steps were taken to secure improvement of these premises.

In Cape May county the causes of an outbreak of typhoid fever were inquired into. The disease appeared in Holly Beach, and it was judged to be due to polluted drinking-water which was taken from shallow wells.

In Passaic county the local Boards, outside of its two cities, have

shown but little activity in dealing with unhealthful conditions. The city of Passaic has no systematic plan for sanitary work at all commensurate with its size and needs. Sewage is cast into cesspools as a rule, and no very energetic measures are enforced to check the spread of contagious diseases.

In Bergen county the local Boards have not generally awakened to a realization of their responsibilities. In this, as in some other localities, public sentiment has not yet become sufficiently aroused on the subject of health protection, and local Health Boards conform in their operations to the popular indifference.

In Monmouth county an almshouse situated near New Bedford post office, was found to be totally unsuited, in its present condition, to the purpose for which it is used. The ventilation is faulty—the atmosphere of the whole building being foul and unwholesome. No bathing facilities are afforded, and the inmates never bathe except when, in summer, a few of the stronger ones go to a creek in the neighborhood for that purpose.

The organization of four new Boards of Health was secured in this county.

The Neptune township Board of Health has adopted a systematic house-to-house inspection, and their ordinances are promptly and judiciously enforced.

In Eatontown, Keyport, Red Bank, Ocean Beach, Freehold, Manasquan and in other communities in this county, there is pressing necessity for further action on the part of local Boards for the improvement of their districts.

In all sea-side resorts the existing dangers to health were pointed out, and local Boards were urged to promptly apply the remedies.

SUMMARY OF REPORTS FROM LOCAL BOARDS OF HEALTH.

BY THE SECRETARY.

In October of each year a printed schedule of inquiries is sent to each local Board in the State. The schedule of subjects sent was as follows:

SCHEDULE OF SUBJECTS FOR REPORT.

A. Location, population and climate.
B. Geology, topography and contour.
C. Water-supply.
D. Drainage and sewerage.
E. Streets and public grounds.
F. Houses and their tenancy.
G. Modes of lighting.
H. Refuse and excreta (how managed).
I. Markets.
J. Diseases of animals.
K. Slaughter-houses and abattoirs.
L. Manufactories and trades.
M. Schools and school and other public buildings.
N. Almshouse, hospitals and other charities.
O. Police and prisons.
P. Fire guards or escapes.
Q. Cemeteries and burial.
R. Public health laws and regulations.
S. Registration and vital statistics.
T. Quarantine or care over *contagious* diseases and vaccination.
U. Sanitary expenses.
V. Heat and ventilation for dwellings.
W. Prevalent diseases of the year.

Other subjects may be named under X, Y, Z. The subjects may thus be referred to by the letters.

If the sheet provided is not sufficient, add others, marked with the letters which designate the topic treated.

With it, there is returned to us the name and post office address of each member of the Board, and of the Health Inspector, where there is such an officer.

The circular sent therewith this year is the one marked Circular LVI., in this report. The directions therein given guard against unnecessary minuteness as to subjects fully answered in previous returns and ask for fuller information on others.

The reports, this year, show a large increase of the number of Boards which are in working order and are looking after local sanitary interests. Thanks are especially due to assessors and city clerks for their faithfulness, and for spreading information among the people. Two hundred and thirty-one of these Boards also have medical members, who help much to give intelligent direction to efforts in behalf of the public health. With the records of vital statistics, these reports, and the information that reaches us through correspondence and through medical societies and associations, we are able to secure much valuable information as to the prevalence or arrest of disease.

Medical men, who were once little concerned as to the etiology of disease and as to the modes of its prevalence, are fast accepting it as a part of their privilege, as well as duty, to protect from the spread of disease. We believe that communities and families should be ready to put higher pecuniary valuation upon these services, and oftener consult such of them as are intelligent as to sanitary requisitions. Many of the reports from which no abstracts are made contain valuable data and information, but it is not necessary to transfer to print unless something special is noted. We ask that comparison be instituted with former reports, in order that those interested may see for themselves something of the progress being made. It is only an occasional township which now regards itself so small or so healthy as not to give some consideration to the avoidable causes of disease.

ATLANTIC COUNTY.

ATLANTIC CITY. *Report from* M. D. YOUNGMAN, M.D., *Sec'y.*

The water-supply of Atlantic City is furnished by a private company, (Atlantic City Water Works Company, Walter Wood, President.) The source is Absecon creek and a small tributary. They rise and flow through a barren, sparsely-settled country, with no sources of contamination in the way of sewage or refuse from manufactories. The water is remarkably pure and soft; it has a slight discoloration, due to the presence of an iron salt in combination with an organic acid. The principal solid constituents (about three grains per gallon of 231 cubic inches) are chiefly chloride of sodium (salt) and chloride of magnesia. The quantity is ample. The reservoir in Atlantic City, consisting of a stand-pipe, is filled twice daily. It has

been found necessary to clean it but once since its erection three years ago, as so little sediment settled. The company are very careful to keep the pipes clean by "blowing off" the hydrants at the dead ends of pipes several times a week. The Board of Health has ordered the discontinuance of the use of lead pipes, and all that were in use have been taken up. It was found that the water being soft and free from those salts which usually encrust the inner surface of lead pipes and thus protect them from the action of the water, there was danger of toxic effects from the use of lead pipes; indeed, several cases occurred. The water is becoming very generally used; those who have not introduced it depend on cisterns.

Atlantic City is now provided with a system of sewerage. Surface drainage is secured, independent of the sewerage system, by a system of underground trunks maintained by the city. The sewerage system is known as the "West System," and is owned by a private company. It comprises a pumping station, with iron and terra-cotta pipes laid below the water-level, the sewage flowing through these to the bottom of a walled well by gravity, and is pumped thence to a filtering station several miles from the city through a line of pipes, where the solid matters are separated and converted into fertilizers. This system was in operation during the past summer and was utilized by all the large hotels and many private cottages and gave entire satisfaction. Whatever fears have been entertained as to its availability here are now dismissed, and while there is involved a question of adaptability to the peculiarities and special demands of the place, which, however, resolves itself into mere matters of detail, there is no doubt of the final complete success of the project. Connection of houses with the sewerage system is not compulsory. All connections are made under supervision of the Health Inspector, and the securing of a permit from him before commencing the work is obligatory. The Board of Health requires the placing of traps at the property line and in all cases a ventilating pipe entering the connecting pipe exterior to the building and extending above the highest point of the building or any higher building within five feet. Those not connected with the sewerage system use water-tight vaults and cesspools, the construction of none others being permitted. They are cleaned by men licensed for the purpose and accountable to the Board of Health. The contents are removed by an odorless excavator and transmitted in sealed dunigans to points

thirty and forty miles away for use as fertilizer. The Board requires permits to be secured for this cleaning, thus keeping it informed as to who does and who does not comply with its requirements. To the faithful performance of these requirements is undoubtedly ascribable the remarkable and gratifying immunity Atlantic City has always enjoyed from epidemic diseases and general illness, particularly when account is taken of the masses of people we have in the spring and more particularly in the summer season.

There are no basements or cellars on the island, and but very few tenement-houses. There are several house-to-house inspections during the year. We have a most efficient Health Officer and an active, interested Board of Health, who realize the importance to Atlantic City of a "clean bill."

Animals are not allowed at large; hogs are not kept within the city limits.

Slaughter-houses are carefully looked after. Bone-boiling and fat-rendering are not allowed in the city, the Board of Health permitting one man, who, in consideration, provides himself with all the modern improvements and appliances, the privilege of collecting all the fat and offal from all sources and rendering them at a point situate at the most extreme limit of the city.

We have no manufactories.

The Board of Health have a city hospital, comfortably furnished and removed some miles from the city, for the reception of cases of infectious and contagious diseases, should necessity arise to quarantine such.

BUENA VISTA TWP. *Report from* THOMAS CHALMERS, *Secretary.*

Diphtheritic sore throat sometimes occurs in the eastern part of the township, near the swamps of the Great Egg Harbor river, particularly after cranberry-picking.

EGG HARBOR TOWNSHIP. - *Report from* NATHANIEL DISBROW.

In offering our annual report we would notice that during the past year cholera has attacked both chickens and swine, although not to the extent of last year.

At the almshouse means for the more thorough ventilation of the building have been effected, and fire-escapes have been erected.

The local Board has passed a complete code of health ordinances

and regular meetings of the Board have been held. A Health Inspector has been appointed at a salary of fifty dollars per annum, who reports at each meeting of the Board his doings. The effect has been the abatement of nuisances and the quarantining of all contagious diseases and an unusual exemption from sickness.

The expenses for strictly sanitary purposes, ending with the fiscal year, have been $55. Such, in brief, is our report for the present year.

HAMILTON TOWNSHIP. - *Report from* D. B. INGERSOLL, M.D.

The refuse and excreta are disposed of in the general way among farmers. The privies in towns and villages are required by the township Board of Health to be properly cleansed and disinfected, as the cases may require.

There has been no prevalent disease among animals during the year. Hog cholera has been more or less severe in all our adjacent townships, yet in but very few instances have we been visited.

The jail is a stone building, containing but ten cells, and this is so crowded in the summer months that the utmost care of its sanitation is necessary to prevent disease. The Sheriff, who is also the warden, uses the utmost care, and thus the jail is kept in as good a condition as the circumstances will permit.

At the organization of the Board of Health for this township, a code of health was adopted and published in our local papers. This had a very salutary effect, and the cause for complaint in every case was removed. The township physician wrote a number of articles on "The Water We Drink," which were published in the local papers in the early part of the summer, which, it is thought, had a good effect in educating on this very important subject. It is our feeling that education in this direction will accomplish much more than stringent laws. Hence, if this subject could be more generally introduced into our public schools, and our children taught the principles, at least, of sanitation, a great good will follow.

We would call the attention of the State Board of Health to the danger to which we all are exposed in the summer months by the many dogs running at large. Scarcely in any township, but that in every little village the streets are full of dogs, and should a rabid dog pass through at night, there could be no estimate of the evils that would follow. The laws on our statute books are inadequate to prevent.

Place it in the hands of the local Boards of Health, with power to act, and the evils will cease. I would suggest a law to prevent them from running at large during certain times.

We have had no cases of typhoid fever this year. Is it because of the general improvement in sanitary matters, and the education of the people in this direction? The same influences—the low pond-water—have been as last year, and last year we had some twenty-five cases. Not a case of diphtheria has occurred in the township during the year, nor has there been an epidemic of any disease since my last report. This gratifying fact does and will encourage our Board of Health to greater activity, for while it has accomplished much, yet there is work still to do.

WEYMOUTH TOWNSHIP. - *Report from* DR. B. T. ABBOTT.

There has been quite a severe epizootic among the swine, proving almost universally fatal and quite general throughout the township. Perhaps 100 hogs, probably more, have died with the (so-called) "hog cholera," but which reveal, on post-mortem examination, congestion of the brain, lungs and liver. A very few only have recovered, after many weeks of illness. They have all been buried soon after death.

There have been no epidemics prevalent in the township during the past year. A few sporadic cases of scarlatina of a mild form. Some seven or eight cases of typhoid fever during the fall, with but one fatal case.

BERGEN COUNTY.

ENGLEWOOD TOWNSHIP. *Report from* DANIEL G. BOGERT, *Sec'y.*

The Drainage Commission has expended nearly sixteen thousand dollars ($16,000) within two years.

All the schools (five in the township) and public buildings in good order. The tri-township poorhouse also in good order. The Englewood Protective Society have fourteen commissioned marshals and a lock-up, with four good cells.

The Board received twenty complaints of nuisances, all of which were abated; also, several nuisances were abated before complained of.

LODI TOWNSHIP. - *Report from* J. VAN BUSSUM, *Secretary.*

There is no public sewerage, or drainage except that attempted by the Riser Drainage Company, on a portion of the meadows. Cellars are usually dry. Malaria is not prevalent.

Refuse and excreta used to aid in supporting domestic animals and in fertilizing the soil.

I know of no evil to health resulting from any of our manufactories.

PALISADE TOWNSHIP. - *Report from* DR. J. M. SIMPSON.

The health of this township has been remarkably good during the past year. There has been no epidemic of any kind, and malarial diseases, which have been so prevalent in years past, are gradually on the decline, so that during the past year there have been but few diseases that could be traced to a malarial origin.

There have been a number of cases of diphtheria during the months of August and September. In one family eight cases, with two deaths, and in another family three cases. Still there was no communication between the two families, and the cases were clearly traceable to filth and a contaminated water-supply. The families were pretty strictly quarantined, and there was no spread of the disease to other families in their immediate neighborhood.

UNION TOWNSHIP. - - - GEO. H. CORMACK, *Secretary.*

The prevalent disease for the past year has been whooping-cough, otherwise our township has been in an excellent condition. There have only been one or two complaints to our Board of Health, which were adjusted by parties owning the property.

BURLINGTON COUNTY.

BORDENTOWN. - *Report from* DAVID T. WAKER, *Secretary.*

The Board of Health of this city have no general report to make, further than the city is in a good and healthful condition. All nuisances complained of have been attended to at once by the Health Inspector; the same consisting of foul water-closets, defective drainage, etc.

CHESTER TOWNSHIP. - - *Report from* CHARLES JESSUP.

When complaints are made to the Board of Health, they are promptly attended to.

Registration of births, deaths and marriages are, I believe, generally made.

Contagious diseases are carefully quarantined, and children genererally vaccinated.

No epidemic of any extent has occurred in this township the past year. Less malarial diseases than usual.

CHESTERFIELD TOWNSHIP. *Report from* THOMAS W. RIDGWAY.

Water-supply is entirely furnished by wells and cisterns.

The township is well drained, no boggy or marshy places.

Cellars are well drained and generally dry.

No malaria at present in township.

All houses have cellars; no basements; no houses with two tenements in.

Refuse is generally carted out and used on the land.

No contagious disease this year.

Slaughter-house, none.

CINNAMINSON TOWNSHIP. *Report from* ALEX. MARCY, Jr., *Sec'y.*

One case of varioloid occurred in a family, the children of which had never been vaccinated, but by prompt isolation, vaccination and disinfection its spread was prevented.

Three cases of typhoid fever which occurred in one family were due to polluted well-water, as was easily and practically demonstrated.

Malarial and enteric troubles have been very much less than common.

Our Board of Health maintains its organization, and is ready for any emergency.

At the spring election, when the people were in town meeting assembled, the Board addressed a communication to them, calling their attention to sanitary matters, and giving much practical and sound advice. This was further supplemented by ordinances promulgated and posted throughout the township, and the results were very gratifying.

Several public nuisances were abated by orders from the Board.

EASTHAMPTON TOWNSHIP. - *Report from* BENJ. T. CROZIER.

Smithville is the largest town in the township, situated on the North branch of the Rancocas, between Pemberton and Mount Holly. Population about 250.

The H. B. Smith machine shops and foundry are located here; owning numerous tenement-houses—which are built separately—streets and alleys dividing them. The by-ways and alleys have received strict attention during the past year from our local Board. By the gentlemanly assistance of the managers of the machine works great sanitary reform has been instituted in these places, and pestilence stayed.

There is a good natural drainage throughout the whole township. The cellars are generally dry, with a few exceptions. We have been spared from much sickness, and have had no epidemics during the past year.

The decrease of malarial diseases has been remarkable, and may in some measure be due to the draining and filling in of wet places, secured by preceding Health Boards. It is proper to say that this policy has been continued by the present Board.

FLORENCE TOWNSHIP. *Report from* CHAS. A BAKER, M.D., *Sec'y.*

Complaints have been made to this Board, of bad drainage, water from cesspools draining into wells, etc. Our course has been to notify the owners to rectify the evil, and we have been snubbed for our pains. We have hesitated to take legal action, the Board being undecided as to the best course to pursue, and there exist several nuisances in our midst which should be corrected.

Cholera morbus prevailed during the summer to an extraordinary extent, together with some dysentery. Malaria is always present, but the past year has been marked by a decided falling off in the number and severity of malarial diseases.

The registration of vital statistics is faithfully carried out by our Assessor, who is painstaking and careful, but it is difficult to impress some of the midwives with the importance of registering births.

There should be a Sanitary Inspector appointed for this township.

MEDFORD TOWNSHIP. - - *Report from* JAMES K. ASAY.

Slaughter-houses are on the outskirts of the town—are well cleaned. One was in the town, but was ordered moved last spring.

NORTHAMPTON TOWNSHIP. *Report from* DANIEL B. SMITH, *Sec'y.*

The water from the creek is forced to a reservoir in Mount Holly, and then through the town in pipes. The pipes and reservoir are frequently cleaned and flushed. The water is soft and is considered very healthy on account of the cedar taste. A private corporation owns the water-works. I should judge one-third of the houses use the creek water, and the rest rely on wells. The well-water is very good in this section. I have not heard of any cases where the water was unfit for use, with the exception of some wells where the water was hard.

When the creek is swollen on account of rain, the cellars in the houses near the creek, and in the lower part of town, have water in them, but very little complaint is made on account of wet cellars. Malaria, fever and chills are very little known in this vicinity. Our slaughter-houses, with one or two exceptions, are in a passable condition; but I should advise a general looking-after another year. Our school-house is too small for the number of children, but the sanitary condition is very good. It is well lighted and ventilated. We have the Burlington County Hospital located here, which is in a very good condition as to the sanitary care, and is kept in first-class order. We have the county prison here, also, which, at times, is quite full. The sanitary condition and keep is very good.

There has been a great number of complaints handed to the Board, of nuisances, and, as a general thing, the result has been very satisfactory.

SOUTHAMPTON TOWNSHIP. - - *Report from* S. E. BRANSON.

Cesspools mostly open. This year the Health Board ordered them cleaned and contents carted out of town. The order was generally complied with.

CAMDEN COUNTY.

DELAWARE TOWNSHIP. *Report from* F. E. WILLIAMS, M.D., *Sec'y.*

Notices from the Board of Health are promptly attended to and the Assessor has no trouble in obtaining prompt returns of births, deaths and marriages.

There has been little or no disease among the animals this year.

Batesville, a small village in the southern portion of this township, and Haddonfield, a large town in an adjoining township, have been visited this fall by an epidemic of diphtheria which was of malignant form in most of the cases, having a high rate of mortality, four deaths occurring in one family resident at Batesville.

CITY OF CAMDEN. - - *Report from* SEPTIMUS KNIGHT.

The laws and regulations of public health here are not very extensive, as the Board has been established but a short time. We are continually adding to our local laws for the protection and maintenance of the health of the city by compelling cleanliness, preventing and abating and removal of nuisances; also, by fumigation in cases of infectious diseases.

Diphtheria and scarlet fever seem to have been the most prevalent diseases of the year.

GLOUCESTER TOWNSHIP, - *Report from* JOS. E. HURFF, M.D.

Several cases of scarlet fever occurred early this spring, but not enough to be termed an epidemic. During July and August quite an epidemic of dysentery broke out in this township. The excreta from these patients was thoroughly disinfected; the highest number sick in one family being four. The Board received but one complaint this year, which was promptly attended to. The drinking-water is almost universally obtained from wells. The general health of the township is good. Malaria still predominates, but not so prevalent as formerly.

HADDON TOWNSHIP, - *Report from* J. STOKES COLES, *Sec'y.*

I will give you the workings of this Board during the past year. We have stated meetings the second Tuesday evenings of each month, and, during the months of July, August and September, we were compelled to have adjourned and special meetings.

We had many complaints of foul privies and hog-pens; some of them were horrid to behold, especially the first named; and it goes against the grain with some of the owners of the property to comply with our demands.

We made a new code of ordinances in September last, and have blank forms printed for the use of physicians and our own use, so we are fully prepared for most emergencies.

Our borough and township during the past year have been healthy, as usual, with the exception of diphtheria, which is now prevalent, and several deaths have occurred from it. It appears mostly in certain localities, one of the streets in the borough having most of the cases.

We elected F. E. Williams, M.D., Inspector for the Board in the summer.

STOCKTON TOWNSHIP. - *Report from* P. W. BEALE, M.D.

We have a regular Board of Health, and everything that can be done for the improvement of the public health is done. No filth is allowed to accumulate; no contagious disease is permitted to exist; no effort on the part of the Board is spared to promote cleanliness and secure for the residents of the township safety from contagion.

The assessor registers every birth, death and marriage.

Vaccination was performed by me three years ago to all in the township who had not been vaccinated, and we use every effort to prevent spread of contagion.

The expense has been greatly reduced this year on account of having no small-pox, which is the first year for some time that we have escaped without a single case.

There seemed to be a marked decrease in the number of malarial fever cases. Considerable typhoid fever has been reported and a number of cases of diphtheria and scarlet fever, but on the whole the health of the township has been what we may call very good.

CAPE MAY COUNTY.

CAPE MAY CITY. *Report from* DR. H. A. KENNEDY, *Secretary*.

The sewers were inspected by the Board last spring, and where needed, city council had them dug up and relaid before the opening of the "season." They are flushed at stated intervals by the steam fire engines. The usual water-level of 8 to 10 feet is sufficient to secure dry cellars.

There is no yearly house-to-house inspection, owing to a lack of funds to meet the salary of a competent Sanitary Inspector.

All cesspools and privy wells are now required by ordinance to be cemented on the sides, with open bottom, and to be emptied twice a year or oftener if required, at night, by a permit from the Board.

There have been fourteen nuisances complained of, and abated, during the summer, most of them caused by accumulations of garbage and slops. An ordinance was passed last May by city council, creating a garbage department, under the control of the city, for the daily collection and disposal of garbage and slops, but like many other ordinances has never been carried out, and the old way of removing the same by careless and irresponsible parties causes the Board considerable trouble.

The keeping of swine within the city limits from May 1st to October 1st, has been prohibited by ordinance of the Board, and carried into effect this year for the first, thus obviating a great annoyance to visiting cottage families during the hot season.

We are happy to report there has been no epidemic during the year, and notwithstanding the great crowd of visitors to our city during the past season, it has been exceedingly healthy.

CAPE MAY POINT. - - *Report from* W. P. EDMONDS.

Water-supply principally from driven wells. At present, the hotels have rain-water stored in cedar tanks, above ground. The Cape May Improvement Company have water-works which supply the three hotels and a number of cottages, also the system of sewers. The company are now sinking an artesian well, which has reached a depth of 240 feet.

There is a main sewer running through the place, back about half a mile, which has about six feet fall. Here the sewer empties into an underground, cemented receiver, from which it is forced, by a steam-pump, through iron pipe, about a half-mile further, on the company's farm, where it is utilized for fertilizing. Connected with the main sewer are branches for the hotels and cottages, each branch of which is supplied with an automatic flush tank. No sewage whatever passes into the ocean. The Improvement Company have a system of drainage for land, distinct from the sewerage system, consisting of open ditches, eight-inch drain-pipe and wind-engine pumps, by which all the ponds in the vicinity have been completely drained.

LOWER TOWNSHIP. *Report from* WM. C. RUTHERFORD, *Secretary.*

Hog disease, supposed to be cholera, has been very bad in this township for the last four months, and quite fatal.

Public health laws and regulations are mainly under the supervision of the local Board of Health.

Registration and vital statistics are reported to the head of the department, monthly, by the Assessor.

Sanitary expenses are provided for by an appropriation of the township, at their annual town meeting.

There have been no prevalent diseases in the township, except the fever at and around Swainstown last May and June, which was in quite a malignant form. On the whole, the health of the township has been good.

MIDDLE TOWNSHIP. - *Report from* STILLWELL H. TOWNSEND.

In some parts of the township there are overflowed swamps and salt meadow, which I think detrimental to the health of the inhabitants who live near them. Very many cellars have water in them some parts of the year.

A swine plague has been going the rounds in the township for about ten weeks, and there is still some of it. Several hundred have died from it. I suppose it to be lung fever. The Board have taken action upon it to see that all animals are buried immediately after death.

UPPER TOWNSHIP. - - RANDOLPH MARSHALL, M.D.

The transition to fall weather was attended with usual derangement, and cholera morbus, diarrhea and dysentery prevailed to an extent unfrequent in these parts. There were two cases during this period which manifested symptoms savoring strongly of Asiatic cholera, though amenable to treatment.

There have been a few sporadic cases of typhoid fever, somewhat malignant in character. One death resulted from brain complication.

An epidemic disease in swine has prevailed here since early summer. Fifty per cent. of the hogs have been attacked and fully seventy-five per cent. of these have died.

WEST CAPE MAY BOROUGH. *Report from* D. C. VANAMAN, *Sec'y.*

No artificial drainage has as yet been attempted, excepting such sluices and drains as the individual owners build; in fact, there seems to be no need, with our present population, for any corporate action in the matter, with the exception of a few acres of low land on what is

known as the "Miller farm." This, in time, may become a breeder of malaria, though, as yet, no harmful effects have been traced thereto.

With refuse of all kinds, of our own producing, we have but little trouble, it being either carted away by farmers and composted, or burned by the tenant;. but with refuse from Cape May City a great deal of trouble is experienced. Garbage carters, being deterred from depositing within the city limits, dump it over the line, leaving us to discover the guilty party if we can; dead horses, cows, hogs, dogs, cats, or any other offal, being freely turned over to our jurisdiction, and with a *sang froid* that is truly refreshing.

The so-called hog cholera has prevailed to some extent among the swine.

The Board of Health was regularly organized under the new law and measures were immediately taken to control the Cape May City garbage carts, swill wagons and swine. The owners of city swine had already began to build their pens within the limits of West Cape May, the purpose being to board the swine of their more unfortunate neighbors at a small weekly profit. In previous years this had been carried on to an enormous extent, upwards of sixty hogs having been kept on a lot less than 50x150. To prevent this nuisance the Board passed an ordinance prohibiting the keeping of swine except by special permit of the Board. Permits were granted to sixty-four persons, subject to conditions. No exceptions were taken to these regulations, except by non-residents.

CUMBERLAND COUNTY.

DEERFIELD TOWNSHIP. - *Report from* C. C. PHILLIPS, M.D.

No epidemics have occurred during the year. Very little sickness and but few deaths, and those were old chronic cases in elderly persons.

The swine plague has been somewhat in places in the township, but not as much as in neighboring townships; but some farmers have lost their entire herd, whilst others only a part.

COMMERCIAL TOWNSHIP. - *Report from* DAVID MCELWEE.

Prevalent disease, malaria, caused by inundated meadows. The owners have allowed the banks to go down, which seriously needs the attention of the State authorities.

Mr. Seth Brown, our Sanitary Inspector, reports the death of 112 hogs, and calls it the hog cholera.

FAIRFIELD TOWNSHIP. - *Report from* W. S. APPLEGATE, M.D.

Besides the ordinary diseases incident to the seasons, we have, during the fall of '84 and the earlier part of winter, passed through a fearfully fatal epidemic of diphtheritic laryngitis, the disease, in most cases, appearing as a rather mild attack of diphtheria, with limited throat exudation, and apparently doing well for a few days, only to be followed by symptoms of laryngal obstruction, in nine of the twelve such cases death ensuing in from twelve to sixty hours from asphyxia.

A few mild cases of scarlatina; no epidemic.

Though the weather has been excessively hot, there has been but little dysentery, or any other bowel trouble, either among children or adults, and that light. Typhoid fever has only occurred occasionally, and the cases mostly of a mild type.

Malaria, severe and persistent, has been much more common than in the two preceding years. There are swamps in the southern section of the township, and large tracts of salt marsh, but the condition as to drainage, etc., is the same as in the preceding year.

A fatal disease, known as cholera, has prevailed among the hogs during the summer and autumn, in sections almost annihilating entire herds, and yet is apparently as little understood as when it first appeared.

HOPEWELL TOWNSHIP. *Report from* CHARLES H. DARE, M.D.

There has been added to our county almshouse during the past summer a building to be used for contagious diseases. It is located some distance from the main building or almshouse, and is to be used exclusively for contagious and infectious diseases. There are two wards in the building—one for males and one for females. The building is of frame and is 18x24, and stands on an elevated piece of ground.

LANDIS TOWNSHIP. - *Report from* EBEN H. FOOTE, *Secretary*.

Since the middle of the past summer, quite a number of hogs have died with what has been called cholera. It was not general over the

township, but only in spots; did not make a clean sweep, but singled out from different pens.

Hogs have been banished from the slaughter-houses, and no complaints have been made the past summer by the neighbors.

LAWRENCE TOWNSHIP. *Report from* ELISTON R. BATEMAN, M.D.

An amount of sickness somewhat above the average is to be reported.

Acute dysentery, following the epidemic of 1884, has occurred throughout the year, increasing during the summer months; diarrhea and bowel trouble very prevalent.

Several cases of diphtheria during the winter; also, several cases of catarrhal laryngitis, a considerable proportion of which ended fatally from œdema of the glottis.

This latter disease occurred concomitantly with a severe and fatal endemic of membraneous laryngitis, which occurred in Fairfield township, an account of which will probably be found in their report.

The "cholera scare" has been an efficient sanitary officer this year, and has relieved the Board of much labor.

MILLVILLE. - - - - *Report from* L. H. HOGATE.

There is no system of drainage or sewerage in the city; surface drainage is all we have. The usual water-level is such as to secure dry cellars. There are one or two swamps near the city, but malaria is very infrequent.

Cesspools are not generally cemented; mostly built with open bottom and sides. They are cleaned by scavengers, between eight o'clock P. M. and six o'clock A. M., the contents removed some distance out of town.

STOE CREEK. - - - *Report from* EPHRAIM MULFORD.

The hog disease, for the first time, has been very fatal in this township during the summer and fall. It has made almost a clean sweep of the pigs. From descriptions given in your eighth annual report, it is the same disease that has prevailed in other parts of the State; therefore it is useless for me to undertake a description. But some of the conclusions you have arrived at I do not think can be sustained, viz.: that it is contagious and that it comes from filth.

We have never been troubled with anything like it before, and hope it is not a precursor of something more serious.

No care over contagious diseases, nor is vaccination looked after.

ESSEX COUNTY.

BELLEVILLE TOWNSHIP. *Report from* D. M. SKINNER, M.D.

There is nothing to be added to former reports, save that the year has been exceptionally a healthy one. There have been no epidemics. Three cases of diphtheria occurred in one family and were attributed to a local cause which the Board abated, and there were no further cases. The Board have employed an Inspector to make a personal inspection of the whole town, and the attention of the citizens generally has been directed to the importance of improving the sanitary condition of their homes.

BLOOMFIELD TOWNSHIP. *Report from* DR. ED. M. WARD, M.D.

The answers to schedule having been made in previous reports, I would only add that our inhabitants seem to realize more and more the necessity of observing sanitary laws. This is shown by the number of applications to the Board of Health for the abatement of nuisances and in the neater and more cleanly manner in which they live and keep their premises. With the exception of measles in a mild form (no fatal cases occurring), there has been no prevailing sickness during the year.

EAST ORANGE TWP. *Report from* T. R. CHAMBERS, M.D., *Sec'y.*

There is a public scavenger service in the crowded districts. Cesspools and privies are used for excreta. They are emptied when necessary, the material is disinfected, dumped in trenches on the poor farm and covered with fresh earth.

Vital statistics are furnished by the Assessor.

The Township Physician is active in the matter of contagious diseases whenever necessary.

Expenses about four hundred and fifty dollars.

NEWARK. - - *Report from* DAVID L. WALLACE, M.D.

The Passaic receives the sewage of the city of Paterson, which is situated about sixteen miles above the Newark intake. In addition to this, as will be shown in the remarks under sewerage and drainage, there are seven culverts opening into the river in our own city, which discharge the drainage of an area of 3,075 acres. With each incoming tide a portion of this is carried to and above the intake. The pollution one and one-quarter miles below the falls, due to the sewage of Paterson, is about three times greater than at the intake, and this demonstrates the power inherent in a flowing stream to purify itself after a sufficient number of miles of flow, and also that between this city and the intake the number of miles of flow is not sufficient to accomplish this in as thorough a manner as the flow between Paterson and the intake. Thus we are obliged to accept the fact that two-thirds of the pollution is due to the sewage of Newark and points below the intake, while one-third is due to the sewage of Paterson and points above the intake. At times the water is discolored, and, as regards taste, it is changeable; at times, no taste being perceptible, while at others, we will get a woody, then a vegetable and then an earthy taste. Taking all the above facts into consideration, one of two things will have to be done; either seek a new supply or purify the present supply by mechanical means, each having their advocates. The advocates of the former insist that nothing can be done whereby the water can attain the standard required, while those of the latter contend that if manufacturers and communities are required to subject their sewage to such a degree of purification as will return the effluent water to the Passaic with at least fifty per cent. of its organic impurities removed, this, together with the purification by flow, will reduce the sewage contamination to about twenty or twenty-five per cent. of the whole; this can then be removed by proper filtration, with aeration, giving us water of an excellent quality.

An elaborate plan has been adopted by common council, not only for the drainage from the sewers in the eighth and ninth districts, but that of all the trunk sewers in the city. This plan consisted of a series of intercepting sewers, to extend from different sections of the city to a point on the margin of the upland and the salt meadows corresponding with the intersection of Miller street and Avenue J, as seen on the city map, where a pumping station was to be erected to contain two pumps, each capable of pumping 15,000,000 gallons in

twenty-four hours; these to be used to force the sewage through two wooden flumes or culverts, four feet square, to be placed three feet below the ground, and to extend from the pumping station on a southerly deflection in a straight line to Newark bay, at the mouth of Maple Island creek, and out into the bay about two thousand feet. It was decided for the present to build only one section, erect the pumping station, and sink the culverts to the bay; the section to be built being that to care for the drainage from the sewers in the eighth and ninth districts. Work was at once commenced and is now being pushed forward as rapidly as possible.

A few years since the common council commenced the plan of inserting $50,000 in the tax ordinance, the amount to be used in improving our streets by removing the cobblestones and substituting the oblong granite blocks. Each year it is decided which streets are to be improved and in which of the unpaved streets the cobbles removed are to be placed. In this way not only are our prominent thoroughfares given a fine appearance, but a number of unpaved streets are improved. Newark has altogether six parks, all kept in an elegant condition, a certain amount of money being appropriated by the common council each year for that purpose.

According to the returns of the census of 1885, as filed in the office of the Secretary of State, there are altogether in this city 19,467 houses occupied by 34,496 families. Most of these houses have basements or cellars, although there are some exceptions. In some instances we have found the cellars of the low grade of tenement-houses occupied, but in each case have compelled the parties to move out, and also ordered the landlord to discontinue the practice of renting such apartments. Up to this year no systematic plan of a house-to-house inspection was carried out, but in June last one was commenced and up to the present time 2,415 houses have been inspected, with the finding of 519 nuisances. Notices have been served for the abatement of the same and 476 have been abated. Numbers of instances of defective drainage were found, and in the majority of instances it was only necessary to call the attention of the owner or agent to the fact when it was at once rectified. We are meeting with very little opposition in this work, which is still being prosecuted vigorously and which is to be kept up until a record of every piece of property in the city is on file in the office of the Board.

The following is a condensed report of the amount of work done by this department from January 1st, 1885, to October 1st, 1885:

Notices served for the abatement of nuisances	2,257
Abatements	2,108
Permits granted for cleaning privy vaults	2,770
" " " cesspools	670
" " sewer connections	694
Number of cases of defective plumbing rectified	461
Analysis of water	10
" milk	29
" ice	5
Persons found unvaccinated	1,225
" vaccinated	2,405

The difference between the notices served for the abatement of nuisances and the abatements can be accounted for to a great degree from the fact that a number of notices were served in the latter part of September that are not yet due, and in some instances where parties ask for an extension of time, and no harm will result thereby, it is in most instances granted.

The number of miles of sewers is fifty-four, and the number of miles of graded streets is one hundred and thirty-two, showing that about five-twelfths of the built-up portion of the city is provided with sewers. A large proportion of the houses on the line of a sewer have connection with it, although, this not being made compulsory, some parties still depend upon cesspools. In localities where there are no sewers, the inhabitants are obliged to depend upon these receptacles, all of which are built with open bottoms and sides, allowing the filth to pass out and not only saturate the surrounding soil, but poison the wells for distances around. Our privy vaults are all built on the same plan, and in a large number of instances, on the house-to-house inspection, were found to be constructed of wood, and, as if this was not vile enough, we have found scores of instances where they have drained the waste from houses into these vaults, and then connected the vault with a public sewer, the idea being to use the waste for flushing purposes, and thus save the expense of cleaning these receptacles. There is a city ordinance prohibiting this without permission from the Board of Health, under a severe penalty, but it seems to have been a dead letter. It is now, however, being thoroughly enforced, and in case parties desire to carry out a plan of this kind, they are first obliged to get permission at this office, and have the work done in the following manner: A water-tight vault is constructed two feet wide, five feet deep, and of any length up to twelve feet, according to the number of houses to be placed over it, these

being in the length, instead of the width, except in cases where more than four houses are required, when the width, at the top only, is increased to three feet and the houses are placed both on the width and length. At a certain distance from the vault, on one or both sides, according to circumstances, a stone foundation is built, to give support to the floors. The vault has a curved bottom, and, from the description, it will be seen that the width is just sufficient for the seats to cover. Extending from the house to the vault is a four to six-inch drain-pipe, with a running hand trap, and which enters one end of the vault about a foot from the bottom; to this is attached the leaders and soil pipe, the latter, in all instances, having to be ventilated above the top of the house. It will be seen that this drain receives all storm and waste-water, and is used for flushing purposes. Extending from the opposite ends, about four inches from the bottom to the sewer, is a six to eight-inch pipe with a running hand trap. Inside of and the same width as the vault, an iron grating is placed, the bars of which are three inches apart, and which extends in a slanting direction from a point seven inches above the opening leading to the sewer to a point on the bottom, six inches from the same opening; this is intended to catch any obstructing material that may be thrown in the vault. From the fact of the opening to the sewer being four inches from the bottom, it will be seen that that depth of water will always rest in the bottom, any amount over that passing on into the sewer, carrying the excrementitious matter with it. There are at present about fifty of these vaults in the city, and all work with perfect satisfaction, from the fact that if there is any doubt about there being a sufficient amount of water for flushing purposes, a permit for construction is refused. The contents of privy vaults and cesspools have, up to the present time, been emptied by both the pumping and pitting processes, but during the summer an ordinance was passed whereby all vaults and cesspools must be emptied by the odorless process and by the pumping process in all cases except where the vaults contained substances not soluble in water, no person to receive a license unless he had a complete outfit consisting of pumps, tanks, hose, deodorizing apparatus, tents, dunigans, etc. It was decided at the time this ordinance passed not to put it into effect until October 1st, in order to give such persons as intended to continue in the business an opportunity to purchase an outfit. At the present time the contents of these receptacles, when removed, are carted to four farms

situated a sufficient distance from all habitation, where they are used for fertilizing purposes. The Sanitary Committee of the Board have under consideration plans for a more effective disposition of the same, and they hope in a short time to have this, which has been a source of great annoyance, permanently settled.

Ashes and garbage are removed by a systematic process of collection, a contract having been entered into between the Common Council and certain parties for a series of years whereby daily collections are made in most of the streets, although in some portions of the outskirts collections are made only every other day. A contract has also been made with the same parties whereby these matters are utilized to fill in the meadow land in the southern section of the city, being afterward covered by from six to eight inches of dirt. All dead animals are also removed by contract and carried to a rendering establishment on the margin of the meadow land some distance from habitation; for this privilege nine hundred dollars is received, which is credited to the Board of Health fund in excess of the amount raised in the tax ordinance.

No person is allowed to keep swine, goats, cows, calves or cattle of any description without a permit from the Board of Health, renewable annually, and which is registered in the office of the Board.

We have in our city at present eight slaughter-houses, and with the exception of one or two, they have been kept in a deplorable condition. Four of them are situated on the margin of the meadow land in the southeastern section of the city, and all refuse from them has been allowed to escape over this land creating a terrible nuisance. This matter has been carefully considered by the Board since its reorganization, and an ordinance regulating the construction of slaughter-houses and the slaughtering of animals has been passed, to take effect December 1st. This ordinance requires that no person shall erect, use or maintain within the limits of the city of Newark, any building for the purpose of a slaughter-house without obtaining therefor a license from the Board of Health, which shall be granted only by a two-thirds vote of all the members; and he shall cause the floors of said building, together with all apartments, pens, etc., connected therewith, to conform to prescribed regulations.

In addition to this the owner shall provide movable receptacles with tightly-fitting covers, for the purpose of receiving and carrying away all the blood, offal, filth, and other offensive matter which may

accumulate in the building or yard; this must be deposited in said receptacles and removed, together with all the fats, hides, skins, tripe and bones, daily, between the hours of six P. M. and eight A. M. The first violation of the above ordinance is punishable by a fine of $50, and each and every subsequent offense by a fine of $100.

The Sanitary Committee of the Board of Education has effected a number of improvements in connection with the schools, and it is to be hoped that the work it has so well begun will be continued until finally all matters bearing upon the sanitary condition of our school buildings are in a perfect condition.

On May 27th, 1885, the Board reorganized and began their work under the general laws of the State governing health matters. All of the ordinances as passed by the common council previous to the reorganization of this Board were adopted as its ordinances, to be altered or amended at such times and in such manner as the Board saw fit. Since reorganization six ordinances have been passed, viz.:

1. Prohibiting the keeping of swine, goats, cows, calves, or cattle of any description, without a permit.

2. Regulating the construction of slaughter-houses and the slaughtering of animals.

3. Prohibiting the keeping or storing of rags, old papers, bones, scraps, or other refuse matter in any building used as a dwelling-house, or to be stored or kept within twenty feet of any dwelling-house.

4. Regulating the stabling and keeping of cows.

5. Regulating the removal of the contents of any privy, vault, sink, or cesspool, requiring that all contents, except substances not soluble in water, shall be removed by means of air-tight apparatus, and only on a permit granted by the Board.

6. An ordinance to prevent the adulteration and regulate the sale of milk.

All of these have gone into effect with the exception of the second, which takes effect December 1st next. It is the intention of the Committee on Laws and Ordinances to continue to formulate ordinances and introduce them as rapidly as is consistent with their proper construction.

At present the Board of Health requires the reporting of all cases of scarlet fever, diphtheria (including membranous croup), and small-pox, and furnishes postal cards to physicians for that purpose. As soon as a card, reporting any contagious or infectious disease, is re-

ceived, the Inspector of the district in which the case occurs, is required to visit the premises and make a complete survey, and have any existing sanitary defects remedied at once, and, if possible, have the patient isolated. In the case of small-pox, the patient, if he lies in a tenement-house, is at once removed to the hospital; in other cases, the patient is isolated in the upper story of the house, and a placard is at once placed on the house to warn others of the existence of such a disease on the premises. In all cases of contagious and infectious diseases, thorough disinfection of the room and all discharges from the patient is required, and, after recovery or death, fumigation of the apartments. No public funeral is allowed in the case of death from any of the above-mentioned diseases. Circulars are furnished, giving directions for disinfection and fumigation, and such articles as are required for these purposes are furnished by the Board, in case the parties are not able to purchase them, and in all cases when asked for, an Inspector is sent to superintend the process of fumigation. In addition to what has been done, in connection with the Board of Education as to vaccination, the co-operation of the teachers, in all our private and parochial schools, has been obtained, and within the past few months, including those vaccinated at the dispensary, about four thousand persons have been successfully vaccinated.

Zymotic Diseases.—Diphtheria, croup and scarlet fever have prevailed more or less during the entire year, alarmingly so during the winter and early spring. Our monthly reports, however, show a gradual falling off in these diseases, and at the present time we have very few cases in the city. There were a great many cases of measles in the southern section of the city during the spring, and whooping-cough was more or less prevalent throughout the whole city. Diarrheal diseases prevailed to a great extent during the warm weather, and many deaths occurred among children; before the warm weather there were very few cases, and since that time the number has been very small, showing that no local causes exist to bring on this class of diseases.

During the past month four cases of small-pox occurred, in three of which (occurring in the same family) the infection was traced to the steamer Eider, the family having crossed the ocean in that vessel in the latter part of August, a case of small-pox occurring in the second cabin during the passage. We have had some few cases of typhoid fever, but in most of the cases brought to the attention of

the health authorities the infection could be traced to some sanitary defect existing on the premises.

Constitutional Diseases.—The only disease to mention under this head is phthisis pulmonalis, the deaths from this disease during the year amounting to 517, showing a death-rate from this disease of 3.37.

In concluding my report I wish to congratulate our Board of Health on the efficient corps of Sanitary Inspectors whom I have to assist me in my work. One and all of them are thoroughly interested in their work, and through their labors scores of nuisances have been ferreted out and remedied, many of which were of long standing. To aid and assist them in their work our consulting engineers, Messrs. Bassett and Nute, are giving them a series of lectures on such subjects as will be of interest to them. These are delivered in my office, and are exemplified by drawings upon the blackboard. After a lecture is concluded the men are given an opportunity to ask questions pertaining to the same. In this way it is the aim of the Board to obtain a corps of inspectors who will be thoroughly conversant with their work, and then, outside of any political preference, to retain them. This object being carried out, there is no reason why its good fruit should not be shown, and the report of next year should bear evidence of it.

The work of milk inspection has been prosecuted vigorously since spring. During the first few months the quality, in a number of instances, was found to be poor and many suits had to be brought. This has had a very salutary effect, and at present the milk as a whole is of very good quality, it being the exception that a sample has to be taken for analysis.

The veterinary and meat inspectors have done excellent work in their departments, keeping a close surveillance over all places which they are expected to visit.

The common council of this city has now made the Board of Health an independent body, with all the powers needed to carry out its work, and if that work does not show its good effects the blame can only rest with the Board.

South Orange Township. *Report from* A. A. Ransom, M.D.

Our township for the last year has been free from all epidemics and but little sickness of any kind. Less malarial diseases than for

the last twenty years. In Vailsburg, a part of our town joining on to Newark, also East Orange, we had a few cases of diphtheria and four deaths occurred. On investigating the cause we found that both Newark and East Orange were drawing night-soil and dumping it on the ground. After we stopped them we had no more trouble. Had no little trouble with East Orange, as they had a strip of land coming out to the avenue, and they acted as if they had a perfect right to use their own lands as they saw fit. But we went before the grand jury with the case and have no more trouble.

I am thoroughly convinced that the contents from privy cesspools, where the evacuations are emptied, may be carried for miles and, after being spread on the ground as manure, a child can take the disease. I have more than one case to prove it. Will state we have no trouble in keeping our place in a good sanitary condition. Have in the spring put into our local paper a few rules and instructions how to put their houses and grounds in order, and have done more good in that way than one would at first think.

GLOUCESTER COUNTY.

GLASSBORO TOWNSHIP. *Report from* JACOB ISZARD, M.D., *Sec'y.*

The houses mostly have cellars, used for storing vegetables. There are two or three cellars that are used for shops or pool-rooms. Most of the tenement-houses are single, only one family in each house. There is a Health Inspector that has visited and inspected nearly every house in the town, and distributed printed rules in every family on sanitary health.

Cesspools are the receptacles of excreta. Some are cemented, but most are not. They are emptied by farmers, who haul the contents out of the town on their farms, which is mostly done in cold weather in the winter time.

There has been no prevalent disease this year. Slaughter-houses have been inspected, and the owners keep them so as not to be a nuisance to neighbors.

GREENWICH TOWNSHIP. - *Report from* WM. G. COWGILL, *Sec'y.*

Source of water-supply is wells almost exclusively, and water is

principally surface-water, especially in the towns of Paulsboro and Gibbstown, and their immediate vicinity. The average depth of wells is about ten feet, except at Billingsport, where they are about thirty feet. The water in the wells along Mantua creek rises and falls with the tide.

Fully one-fourth of the land in the township is reclaimed land, the majority of which is included in the Repaupa, Clemmell and Mantua Meadow Companies. They are mostly well-drained, except a portion of Clemmell meadow, of which there has been some complaint. Drainage is accomplished by natural water-courses, dykes, ditches and sluice-ways. The township is nearly level, and it is almost impossible to secure proper drainage in towns. Practically, the water is allowed to work its way down into the soil. Cellars are usually dry, mostly cemented, shallow and above water-level. Malaria prevails at times, especially after very high tides or heavy rains that flood the meadows. Very few cases of malaria this year.

George C. Laws, M.D., of Paulsboro, adds as follows:

The past twelve months have been remarkable for general good health, especially during the months of July, August and September. In connection with low-water level, there has been less fever of malarial type than at any time during five years. There have been some cases of typhoid, or rather typho-malarial, fever. Typhoid fever, *per se*, is rarely seen in this vicinity. In April and May, there were a few cases of bilious-remittent fever.

November, December and January, there was a general epidemic of influenza, in which muscular pain was a prominent symptom. In January, February, March and April, a decided epidemic of whooping-cough, and in February, March and April, an epidemic of scarlatina. In connection with the epidemic of influenza, there was an unusual number of cases of rheumatism. A few cases of malarial fever, especially in the neighborhood of the meadows.

This township, and, in fact, the entire neighborhood, is remarkably free from phthisis, but glandular affections (non-suppurating) are common. There have been eight fatal cases of Hodgkins' disease (malignant glandular-sarcoma) in the neighborhood within the past ten years. Renal calculus is also a comparatively common affection, especially in the town of Paulsboro.

HARRISON TOWNSHIP. *Report from* E. E. DE GROFF, M.D., *Sec'y.*

Our dwellings all have cellars. In some instances they are used for the storage of vegetables, and occasionally, from investigation, we have learned that typhoid and malarial fevers have arisen from decomposition of vegetable matter in the cellars.

With the exception of the usual amount of bowel disorders and diseases incident to children, during the summer months, we have had no epidemics.

Malaria does not seem to be so prevalent as that of last year. Our community is almost free from hog cholera, and entirely so from pleuro-pneumonia among cattle.

LOGAN TOWNSHIP. - *Report from* S. B. PLATT, *Secretary.*

No sewers. Cesspools and privy vaults heretofore have been built with open sides and bottom, but now some old ones are being cemented and nearly all new ones are being built with tight bottoms and sides; contents generally used for fertilizers.

Local Board have adopted a sanitary code, the circulation of which has been some advantage and benefit by calling attention to sanitary matters which would otherwise escape notice.

Returns are generally made once a month, and few cases of neglect.

Physicians report less sickness in township this year than for any one year for six years past.

Three complaints of nuisances have been made to Board this year, and on notice to owner or tenant said nuisances were abated, as far as possible.

MONROE TOWNSHIP. - *Report from* L. M. HALSEY, M.D.

The sanitary condition of the town has been very much improved during the last year. All property owners seeing the necessity of this have tried to keep their property in good condition. Privies are more frequently cleared; disinfectants more freely used, and at this writing our town is in better condition than for years past. A great deal of trouble arose from so many pig-pens. This nuisance has been almost entirely abated. Dysentery has been the prevalent disease the last summer, over a hundred cases occurring in the township. At present measles are epidemic. There have been some cases of typhoid fever, but all have been traced to bad water. In one family six have been

down. Not of a fatal type. The Board of Health have issued a pamphlet, giving instruction as to keeping nuisances abated. We have attended to all complaints and make regular examinations (house-to-house) as often as deemed necessary.

WASHINGTON TOWNSHIP. *Report from* CHARLES D. NICHOLSON.

In making my assessment this summer I had a good opportunity to look over this township, and I found it in a good, healthy condition. Dysentery prevailed among small children during July. The hog cholera is in some parts of the township, some forty having died. No nuisances have been reported this year.

WEST DEPTFORD TOWNSHIP. - *Report from* LOUIS K. WILKINS.

We take every precaution against contagious diseases. Vaccination is carefully looked after.

WOODBURY. - - - *Report from* W. MCGEORGE, M.D.

The statistics of births, marriages and deaths from our city show that eighty-two births have been reported to the city clerk, forty-six deaths and forty-five marriages. The health of the city has been good. The Board of Health have done efficient work, and our city is in good sanitary condition. Many of the low places have been drained, and more care is observed in keeping drains open and dirty water moved. Compared with ten years ago the number of cases of intermittent fever are one-half to two-thirds less in number, and the cases of diphtheria fully seventy-five per cent. less. There is very little typhoid fever at any season of the year compared with what we used to have. A violent outbreak of whooping-cough has resulted in a few deaths, but on the whole all forms of disease are controllable and readily yield to treatment.

The most important question agitating our people now is the one relating to water works. The vote has been in favor of building, and council are now constructing the works. Unfavorable criticisms have been made because competent and unprejudiced experts were not engaged to thoroughly and carefully analyze and test the water. It is believed to be pure, and so reported on a partial test, but the fact of its flowing over and near marsh beds, and being subject at times to receive the drainage from the West Jersey Marl and Transportation

Company's marl beds, has set some of our people against the source of supply.

Another objection is that no provision has been made to get rid of the waste-water that will be so plentifully distributed, and the fear that adding the cost of sewers to that of building water works will largely increase our indebtedness and not increase the health of the city. Some of us had hoped that one of the experts of the State Board of Health would have been invited to make an official investigation and report of the whole matter.

WOOLWICH TOWNSHIP. - *Report from* DANIEL LIPPINCOTT.

Public health laws and regulations are enforced where needed in case of filthy pig-pens, privies and decaying vegetation, etc. A great public nuisance exists at our depot. New York manure is landed there almost daily and unloaded. The stench is terrible and ought to be removed, but the township so far has been unable to stop the nuisance. The State Board of Health will have to attend to this matter, for the railroad companies promise but never fulfill their promises to local Health Boards, and the expense would be more than the township would willingly pay.

Sanitary expenses have been nothing during the year, everything going along nicely, and no cases requiring any other duties from the Health Board officers than requesting individuals having nuisances existing on their premises to remove them.

Contagious diseases have not been in this township this year. Dysentery existed pretty generally during July, but in a mild form, few deaths being reported. Malarial affections we have with us at all seasons of the year, but less during the past than during the preceding year.

HUDSON COUNTY.

HUDSON COUNTY. - - *Report from* E. J. ROONEY, Jr.

There was an outbreak this year of scarlet fever, which was almost exclusively confined to Jersey City. It occasioned 277 deaths in that city, the greatest number that has occurred in the county in the last eleven years. In some cases all the children of a family would be carried off.

It first assumed a serious extent in October, 1884, and culminated in November and December of that year. It ran through December, 1884, January, February and March, 1885, without diminishing much in virulence, and subsided by June, 1885.

This Board is frequently called upon by the authorities of towns and townships to aid them in compelling refractory citizens to abate nuisances. Much has been done by legal action on the part of counsel of this Board, and otherwise to apply and enforce a remedy in such cases; also by conference with the authorities defects of sewerage, etc., have been corrected.

The rapidly increasing population of some of the northern towns has brought the subject of disposal of sewage prominently forward, and the obstruction of primitive water-courses has often been the cause of contention, in the settlement of which the aid of this Board has been invoked.

In the case of Jersey City much complaint has been made of the condition of certain sewers, drains and natural water-courses, and of Mill creek, a sluggish natural stream, part of which winds its tortuous course through the sunken marshy land from the Bergen ridge, near Newark avenue, to the New York bay.

The condition, filthy and ill smelling, of these drains has been brought to the attention of the honorable the Board of Public Works of Jersey City, which body has jurisdiction of such matters, but so far, owing to lack of funds, only temporary remedies have been applied, such as the removal of accumulated rubbish. It is to be hoped that an appropriation for these uses can speedily be obtained by the Board of Public Works, so that effectual measures of relief can be prosecuted.

Much could be done by the city to better the drainage of the Heights by keeping the gutters free from obstruction. In many cases their being choked up causes the foulest odors to be exhaled from the quagmires that form in the unpaved streets. The authorities are being constantly urged in this matter.

There is great need of sewers in the Bergen Ridge section of the city, a need that is being but slowly supplied.

The census shows a very rapid increase of population of Jersey City. Much building is going on, many of the structures being of the tenement class.

The financial obligations of the city restrain the making of many

of the indicated necessary improvements in the shape of sewers, etc. A house-to-house inspection of privy vaults was carried out under the direction of the Health Inspector of Jersey City, Mr. D. W. Benjamin, and in all cases where found necessary vaults were ordered to be emptied.

The disposal of night-soil has been long a problem to the city. A scow has been used, which, when filled, is taken away and the contents disposed of to farmers along the Jersey shore. Often three weeks elapse before there is any receptacle ready to receive the contents of vaults.

It was necessary this summer to devise some plan to dispose of excreta in the absence of the scow. Arrangements were made by this Board and by Jersey City with local farmers to allow of excavations on their land in the suburbs of the city and outlying towns. In these pits the night-soil was dumped and covered with earth. Some objection was made by the residents of some localities, but now the plan is carried on in such a manner as not to annoy any one.

Arrests were made by the Inspectors of this Board of scavengers who did not comply with the terms of the special permits under which they were working. The Inspectors of the Board have frequently been out all night watching scavengers in order to arrest those who dump night-soil on the county and other roads, of which much complaint is made. None have been detected. It is difficult to catch them in the act of depositing the material, as they take precaution to be certain of no one's being in the vicinity when they do so.

The whole business of taking away privy-vault contents is carried on in a much less objectionable manner than formerly, owing to the enforcement, in several cases, of the penalty attached to the infraction of the ordinance covering this subject.

Closed wagons are now used generally by the swill and fat gatherers, instead of the reeking, uncovered boxes and barrels formerly the rule. This reform has been brought about by arrests, in many cases, made under the ordinances passed by the Board.

Many improvements have been made by slaughter-house owners at the suggestion of the Board's Inspectors, and an amelioration of the offensive sights and noisome odors has resulted. Much, however, might yet be done.

The State prosecuted keepers of piggeries and swill-boiling estab-

lishments in the northern part of the county, with the effect of driving many of them out of the business.

The Board, this summer, proceeded to consider methods of abating, if possible, the nuisance caused by stagnant water on sunken property in various parts of the county. It was determined to select one section and try what could be done to compel private owners to fill up to grade. An act was passed at last session of the Legislature empowering the Board to fill such lots and make the cost a lien on the property. Armed with this power, the Board selected the section of Jersey City from Fifteenth street north to the city line, between Grove and Henderson streets. Its efforts, through counsel, have met with wonderful success. Owners of all the sunken property have signified their intention to fill up as rapidly as possible.

In Hoboken, much filling has been done by private enterprise. The Board has begun to take steps in order to ascertain if measures cannot be had to compel the filling of the sunken property adjacent to the elevator of the North Hudson County Railway, which company have done much, by filling along their line, to better the sanitary condition of the adjacent property.

An effort is now being made to have the honorable the Board of Public Works of Jersey City, by placing drains, to relieve from surface-water the sunken meadow land between the Erie Railroad and Newark avenue, Brunswick street and the Heights. It is hoped that a feasible plan will be devised.

An act giving control to this Board, of plumbing, ventilation and drainage of buildings, was passed at last session of the Legislature. In view of the increasing density of population in many sections of the county, this is a matter of importance.

The assistance of the Counsel of the Board has been found necessary, in order to restrain persons engaged in business liable to cause the spread of contagion, such as dealing in emigrant bedding from ocean steamers. These beds are bought by parties who take out the straw, bale and sell it for stable bedding. The ticking is often used to cover barrels containing vegetables, etc. The Board has been uniformly successful in such suits. In most cases, the mere threat of legal action has been found sufficient to correct abuses.

Persons carrying on offensive trades in unsuitable locations have been compelled to seek other and more appropriate sections.

HUNTERDON COUNTY.

CLINTON TOWNSHIP. - - *Report from* JOHN SHURTS.

The Board of Health has been called together several times during the past year to act upon complaints of nuisances. Such nuisances consisted of foul cesspools and bad and defective drainage. Upon the action of the Board, however, the nuisances have been abated and removed, and there appears to be a kindly spirit on the part of the inhabitants to comply with any request or demands from the Board.

During the months of July and August heavy and unprecedented rains caused an overflow of the banks of the streams passing through the township. Besides doing much damage, this overflow resulted in a vast surface of waste material placed under the heat of the sun, and in consequence diseases of a malarial type have occurred within these limits. Also, during the months of July and August and September there were numerous cases of diarrhea, of a dysenteric type, caused probably by the great quantity of surface-water which was forced into the wells by reason of the heavy rains. No contagious diseases are reported. The health of the inhabitants has been up to the usual standard, except the water trial trouble hereof spoken.

FRANKLIN TOWNSHIP. *Report from* GEO. HOFFMAN, *Secretary.*

A few cases of typhoid fever and scarlet fever, also diphtheria, have occurred.

BOROUGH OF FRENCHTOWN. *Report from* GEO. C. LANDON, *Sec'y.*

Surface drains are the only means of carrying off the water. There is no system of sewerage. In the spring of the year the cellars are often partially filled with water. There are no swamps in our borough, but the general surface is level and the water does not readily flow off except in those streets that are more thickly inhabited, where more pains has been taken to secure better drainage.

Cesspools are mainly employed to dispose of the waste-water and slops from the house. These cesspools are seldom cemented.

Our principal school is located on a hill, and is in four departments. The health of the pupils, I think, is carefully looked after by intelli-

gent teachers and trustees. The buildings are not overcrowded so as to endanger health.

Since my last report the local Board of Health has passed its sanitary ordinances, conforming to the requirements of the law of the State, fixing penalties for violating its provisions.

Our local Board is now in a good working condition. The citizens generally take pride in keeping cleaned up. There are, however, a few things which will need to be looked after in the near future if we would keep our borough in a healthy condition.

The physicians look after the vaccination, and when any contagious disease makes its appearance the patient or patients are quarantined.

The Board of Health appropriated fifty dollars for sanitary purposes.

Since my last report the sunken lot, owned by the Pennsylvania Railroad Company, below the depot, has been drained by running a pipe under the railroad adequate to carry off the water which collects in the spring, and becoming stagnant tends to produce malaria and other diseases.

HOLLAND TOWNSHIP. - - *Report from* J. F. ANDERSON.

I have the pleasure to state that the valuable suggestions of the State Board have been fully carried out, thanks to the enterprise of Messrs. W. and E. Thomas, and the favorable action of our Township Committee. I mean the suggestions in regard to removing the obstruction in the creek that passes through our town, and the throwing up of embankments on its eastern shore. The work done, we confidently expect will prevent the annual or semi-annual overflow of one-half of our village, and consequently remedy numerous ills that human flesh is heir to.

KINGWOOD TOWNSHIP. *Report from* GEO. E. DALRYMPLE, *Sec'y.*

The health of the township has been good during the past year. There have been a few cases of scarlet fever, but only one death therefrom. I have called on every family in the township during the past year, and there was only some three places but that were kept in a clean and decent manner.

LAMBERTVILLE. - *Report from* GEO. M. HOLCOMBE, Jr.

Houses generally have cellars. Very few houses occupied by more than one family. We have a yearly house-to-house inspection.

Cesspools with open bottoms are generally used; contents generally removed in barrels and taken from premises. In the past year privies at about two hundred residences have been cleaned and contents removed.

LEBANON TOWNSHIP. - *Report from* A. S. BANGHART, *Sec'y.*

Excreta is generally disposed of by burial, and very often is left to decompose on our vacant lots.

There has not been no disease among animals with the exception of cholera among fowls.

Our butchers are careful as to the refuse, and the slaughter-houses are kept clean.

Our school-houses are in good repair, and are as well built and ventilated as any in the State.

The past year has been healthy, no epidemics of any kind having made their appearance in our township.

Our local Health Board is active, obeys all summons, and in all cases strives to do its duty.

READINGTON TOWNSHIP. - *Report from* D. T. STRYKER.

The township Board of Health has received several complaints of foul drains, etc., have notified the owners and they attended to them. It has been generally healthy.

TEWKSBURY TOWNSHIP. - *Report from* O. A. FARLEY, *Sec'y.*

The general health of the township has been excellent during the past year, except the village of Califon, in which village typhoid fever has been prevalent during the past month. The disease is supposed by the attending physician to have originated from stagnant water in the cellar.

MERCER COUNTY.

CHAMBERSBURG. - - *Report from* JAMES H. TINDALL.

Garbage and refuse carted away at the expense of citizens and deposited with farmers outside borough limits, for use upon their land as manure.

There are only three slaughter-houses in the borough and they are in a clean, healthy condition, and are visited monthly by the members of the Board of Health.

HAMILTON TOWNSHIP. - *Report from* WILLIAM T. YARD, *Sec'y.*

The Board of Health met at Hamilton Square to inspect the rubber works, pig-pens, slaughter-houses and other sources of nuisance. We found the slaughter-houses in a good state of cleanliness, but some of the pig-pens and yards in a very filthy state. We ordered them to have the same cleaned up and use disinfectants. We found the rubber works in a bad state as to drainage. They drain into the street the waste from the rubber, which is a source of annoyance to the property owners along the street. We want to have them drain the same on their own property.

The township is in a healthy state. The death-rate is one-third less than it was the year before.

PRINCETON. - - *Report from* PROF. J. S. SCHANCK, M.D.

No public sewers yet, but privies and cesspools. The college distribution is on surface of about twelve acres, and is fairly satisfactory. We need public sewers. Some of our cellars are damp. Some malaria; less than two years ago. But few basements are used as kitchens. No systematic house inspection.

Frequent publications in town paper by Board of Health. Just now engaged in formulating a code of regulations.

Much care and anxiety during the year regarding the prevalence of diphtheria. Considerably over one hundred cases have occurred in and about Princeton since early spring, and a large number have proved fatal. It is almost entirely confined to children—largely the indigent and with unfavorable surroundings. Many cases may be traced to direct communication with the disease. Many have appeared to begin spontaneously. Latterly it is much intermixed with scarlet fever. The diseases seem very closely allied. We have been thorough in fumigations and care. Only tolerably successful in preventing public funerals.

TRENTON. - - *Report from* WILLIAM CLOKE, *Secretary.*

I beg herewith to submit my third annual report of the operations of the Board of Health of the city of Trenton. The Board organ-

ized on the 24th of July, 1882, and at present comprises the following membership: President, Dr. John Woolverton; Health Inspector, James H. McGuire; Secretary, William Cloke; Dr. Cornelius Shepherd, Thomas S. Chambers, Dr. Joseph B. Shaw, G. D. W. Vroom. Since its organization the Board has accomplished important sanitary reforms. It has secured the establishment of a complete system of garbage removal. Heretofore garbage was removed by the individual citizens at their will and pleasure. In many cases it was dumped in back yards, in alleys and any out-of-the-way corner that was convenient. As a consequence the city was fairly gorged with refuse, and the air in warm weather reeked with the fumes. All this has been remedied by the removal of the garbage twice a week in winter and oftener in summer, by persons employed for that purpose under contract.

Another great reform which the Board has brought about is the absolute suppression of the ancient and obnoxious system of cleaning out cesspools with buckets, and carting the contents away in ill-constructed tanks that often slopped it all along the streets. This system had been in use in Trenton from time immemorial. It was very offensive, particularly in hot weather. When a privy vault was being cleaned out the whole neighborhood was saturated with insufferable stench, and people were often made ill by the nuisance. The Board passed ordinances abolishing this system, and providing for the cleaning of cesspools and vaults by inodorous excavators. The change has been a great relief to the city.

The Board has also secured the abatement of what was known as the water-power nuisance. The raceway of the water-power—an artificial stream—was used as the general cesspool or sewer for hundreds of privies, creating in the summer a terrible nuisance. This nuisance has been completely abated. The Board has carried through the Court of Chancery and court of last resort a case which fully establishes the rights and powers of Boards of Health established under the act of 1880. It has made decided headway with the vexed Petty's Run nuisance, and has it in its power to put a stop to it at any time, under the decision of the court referred to. The Board has refrained from exercising this power to the utmost, in the hope that the great inconvenience which would thus be caused may be averted by the adoption of a system of sewerage by the city.

The Board has done all in its power to forward the sewerage

project, and the enterprise is now in a hopeful condition. A plan prepared by Engineer Rudolph Hering has been adopted by the city, and the construction of the outfall sewer and some of the more important intersecting sewers will be commenced in the spring, if some additional necessary legislation as to the payment for the work can be obtained from the Legislature this winter.

During the three years that it has been in existence the Board has secured the abatement of more than fifteen hundred nuisances of various degrees, and has markedly improved the sanitary condition of the city. From the recent annual report to the Board by the Health Inspector. I make following extracts:

"The health of the city for the past year has been remarkably good, there having been no epidemic of any kind whatever. Our markets have received my careful attention. I am glad to report that they are generally supplied with good and wholesome food. The milk-supply has also received my attention, and there have been a few arrests made for selling adulterated milk, which have resulted in conviction in each case, and by this good effect we now think the citizens are receiving a pure article. The water supplied by the city is most excellent and much credit is due the management of the water-works for the uniform quality of water supplied. We have caused a number of wells to be abandoned and filled up, and there are no doubt many others that should be abandoned and will receive our attention as they are brought to our notice. The public schools have been visited and found to be in good sanitary condition, with perhaps the exception of poor ventilation in some of them. I have visited and inspected the county jail and find it in a most excellent sanitary condition so far as cleanliness goes. Physicians have reported the following number of cases of contagious diseases during the year: Typhoid fever, twelve cases; diphtheria, forty-five cases; scarlet fever, forty cases; scarlatina, twelve. There have been 601 deaths reported during the year. There have been about 1,000 privies and cesspools emptied during the year, and about 600 nuisances of various kinds reported at this office, and 107 compulsory notices served."

WASHINGTON TOWNSHIP. - - *Report from* JOHN B. YARD.

The health of the township is very good. Only one complaint this year; it was about some phosphate stored in the freight-house at Windsor. I saw the agent of it and he said he would move it off

out of the village and did so. It smelled very bad, night and day, while it lay in the freight-house. It is all wrong thus to store different kinds of fertilizers in our small towns on the line of our railroads. Some of it has a very sickening smell. It should not be placed almost in a man's door, and left for months for us to breathe night and day.

MIDDLESEX COUNTY.

NEW BRUNSWICK. - *Report from* T. L. JANEWAY, M.D., *Sec'y.*

Upon the matter of drainage it seems proper to remark that the drainage of the lower part of the city is extremely defective, and owing to the present incomplete system of sewerage it is an almost insurmountable trouble, owing to the fact that the level of the water in the Delaware and Raritan canal, which occupies the water-front of the city, is above the bottoms of many of the cellars; in times of freshets many basements and cellars are filled with water, producing a condition necessarily far from salubrious.

The streets are very badly paved; many ruts and holes allow water to stand in them, which becomes contaminated with the excreta from animals, and under the summer sun exhales noxious gases.

The houses are mainly comfortable homes and not subject to much overcrowding.

Just upon the confines of our city we have several slaughter-houses, and within the more densely populated portion of the town is a hide-cleaning establishment which have been the source of much complaint and a standing cause of complaint to this Board.

During the current year 1885, a small emergency hospital has been established, which has afforded much needed assistance to the suffering, and has, we trust, been the means of saving some lives.

During the year 1885, the Board of Health, feeling the necessity of increased power, has reorganized under the laws of 1880–81, and, we trust, has been more efficient in its operation than ever before.

This Board feels that the subject of vaccination is one demanding serious consideration, not so much from any tendency towards negligence, as from the want of confidence in the efficiency of the virus supplied from many establishments having no legal authorization. It would seem that governmental action might effect marked improvement in this direction.

The popular vote has awarded the sum of $500 to this Board for its current expenses, and thus far this has been sufficient for our needs.

In the main the past year has been free from any marked epidemic. During the summer there was a marked tendency to dysentery, and we have more typhoid fever than should exist in our population. This tendency has been jealously watched and we hope by the care and industry of the members of our committees that the sources of disease may be detected and rendered harmless.

During the summer months the nuisances due to imperfect drainage and fermenting sewage in the gutters were combated by disinfection. A large cask provided with a hose and sprinkler was mounted on a cart, and by means of this apparatus gutters and streets were readily disinfected. This committee made a thorough inspection of the city, and marked in red on the map published by the Board, the gutters, etc., requiring disinfection. This map was then placed in the hands of the man employed for the purpose, who immediately proceeded to distribute disinfectants in all places so designated.

The solution used for disinfection of streets was made by dissolving corrosive sublimate in water, in the proportion of eight grains to a pint of water and adding sufficient crude carbolic acid to give the solution a distinct odor. This disinfectant was found to be very satisfactory in its action.

A printed form of blank for any complaints was issued by the Board of Health, and placed in all of the drug stores of the city. The intention was to make the citizens realize that the Board was working for their good and was desirous of acting promptly in all matters in their jurisdiction. The distribution of circulars had an immediate effect in greatly increasing the number of complaints, and consequently the efficiency of the Board. The confidence of the people in the work of the Board was also much increased.

PERTH AMBOY. - - *Report from* CHARLES K. SEAMON.

During the past summer the health authorities of the port paid close attention to all incoming vessels from foreign ports, and application will be made at the next session of the Legislature for additional powers to quarantine and inspect such vessels, which is greatly needed.

Considerable sickness, chiefly malarial, has occurred at a new settle-

ment in the north end of the town, the majority of which was among Poles and Scandinavians.

The company from which the city obtains its water-supply has in course of construction an artesian well, which, it is hoped, will prove a source of great convenience to the public, as last summer it was cut off from the water-supply for over a month. There is an abundant supply at present from springs and surface-water, and of a better quality than is sometimes furnished.

SOUTH BRUNSWICK. - - *Report from* CHARLES L. STOUT.

There has been no disease among animals reported to the Board, and do not think any existed, as inquiry was made during my annual visitation throughout the township. Slaughter-houses are looked after, and, am happy to say, are kept in good condition. The schools and school-houses are in good condition in the main, and the system of ventilation is receiving more attention than formerly. The cemeteries are generally near the churches, and are not laid out in regard to sanitary regulations. An epidemic of measles swept over the township in April and May last, and caused some of the schools of the township to close, but no fatal cases. All circulars of the Board are promptly distributed, and can say no complaints to Board of nuisances have been made.

WOODBRIDGE. - - *Report from* JONAS H. CODDINGTON.

Have had no occasion for quarantine; vaccination is not enforced in the public schools by the trustees as it should be.

Nothing unusual, with the exception of quite a number of cases of dysentery in the southwestern part of the township, a large percentage of which were fatal.

Of possible causes of sickness or sources of hazard to the public health, we regard as worthy of mention a small stream used to carry off sewerage matter from a number of dwellings and water-closets along its course. This stream becomes quite dry in its upper portion during the summer, and in its lower portion is much filled up and obstructed; also, there is considerable undrained and swampy land in or near the village of Woodbridge.

MONMOUTH COUNTY.

EATONTOWN. - - - *Report from* W. B. BEACH, M.D.

The Board of Health have held monthly meetings during the summer. Have urged that every one take an interest in sanitary affairs. Inspection and legal notice have done much toward the removal of the causes of diseases.

FREEHOLD TOWNSHIP. *Report from* O. R. FREEMAN, M.D., *Sec'y.*

Great good has resulted from the establishment of the Boards of Health in city and township. In one instance only has there been shown a disposition to defy their authority. The contents of the cess-pool connected with the county jail were deposited within the limits of the town, and after notification by the town Board, the nuisance was partially abated. Complaint was again made, and this time to the township Board, as the nuisance then existed beyond the corporate limits, but still in a locality dangerous to the public health. Evading the notification of this Board, the offenders were proceeded against by suit at law, and punished by a fine.

The storing of phosphates and manufactured manures in barns and store-houses, on the outskirts of the town, was made a subject of general complaint by neighboring residents, but notification by this Board was followed by prompt abatement of the nuisance complained of.

The past year has been marked by comparatively little sickness in the township. In the autumn of '84, typhoid fever made its appearance in one locality and spread among three or four families. All the cases were severe and protracted, but all in the township were successfully treated. The fever originated from impure water. A barrel, sunk but a few feet below the surface of the soil, with a very meagre supply of water, constituted a shallow well providing all the water used by a large family. Here, spring-water and surface-water mingling, produced an impure and stagnant pool—typhoid fever resulting as above.

During the winter there was also a general epidemic of measles, but fatal only in a few cases.

FREEHOLD. - *Report from* WILLIAM J. MCCLURE, *Secretary.*

The county jail, I am sorry to say, has undergone no change for the better, although the attention of the Board of Freeholders has been called to the matter several times. The cesspool is a matter of frequent complaint from the accumulation of liquid matter and filth, and the unfaithfulness of the party who has contracted for the emptying of its contents.

Several so-called cesspools have demanded the attention of the Inspector, and a notice to the occupants of premises where these nuisances have existed, has resulted in having the evil in most cases remedied.

Our town has been free from epidemics; several cases, and a few deaths of children from diphtheria, confined to the locality adjacent to the depot of the New York and Freehold Railroad, were noticeable, but they could not be traced to any conditions of the surroundings.

We find persuasion answers a very good purpose, and, although our efforts to improve the sanitary condition of the town have not at all times been successful, yet we are hopeful and avoid unnecessary expense in the enforcement of ordinances.

MATAWAN TOWNSHIP. *Report from* BENJAMIN GRIGGS, *Secretary.*

Last March, in conformity to a general law of the State, by a vote of the inhabitants, the village of Matawan was constituted into a borough.

The borough commissioners have appointed William Spader, Richard Bedle, Dr. Cyrus Knecht, Peter C. Disbrow and Benjamin Griggs as a Borough Board of Health.

Said Board of Health met in July and organized by appointing William Spader, Chairman; Dr. C. Knecht, Physician; Peter C. Disbrow, Health Inspector, and Benjamin Griggs, Recorder of Vital Statistics and Secretary.

MIDDLETOWN TOWNSHIP. *Report from* R. S. SNYDER, *Secretary.*

There was some cause of complaint of neglected privies, and of decaying animal matter in a community at Seaville. The Board of Health viewed the premises and served notices on a number of the owners, and posted ordinances for the maintenance of excellent

sanitary improvements, which were unanimously complied with, and all of our borders are now exceptionally exempt from disease, the death-rate being unusually low for so large a township.

The Board has been highly indorsed by the local press for its energetic administration.

ASBURY PARK. - *Report from* RANDOLPH ROSS, *Secretary*.

During the past year the Board of Health has continued its work of detailed examination of premises. Every general re-inspection discloses new defects in construction or management, and it has been found that constant watchfulness, by a keen Inspector, is needed to prevent both owners and tenants from creating dangers to health. Decided benefits have been realized from the use of inspection records. Without them the Board would be unable to satisfactorily carry on its work, but by their aid the most important classes of dangers can be learned, and the labors of the Inspector can be directed to advantage. In October, 1884, the Board instructed the Sanitary Committee to inquire concerning the privy vaults of certain hotels and boarding-houses which had been reported as objectionable during the previous summer. After visiting the premises indicated, the committee advised that the vaults on thirty-eight premises be declared to be nuisances endangering the public health. This was done, and notices were sent to the owners, requiring that these structures be excavated and filled with earth.

Nearly all of these vaults were made of brick and cement, and were believed to be water-tight, but they were so situated that offensive gases entered the dwellings. Before May 1st, 1885, thirty of these vaults had been removed, and plumbed water-closets substituted. Only one suit was brought to enforce the orders of the Board in this batch of improvements. More of the same work will be done this fall.

Wooden cesspools are now so nearly eradicated that little remains to be done with that class of annoyances. Only ten of these structures now exist in the borough. The Board has caused the water to be analyzed in places where soda water or pop beer is manufactured, and has secured the closing of two polluted wells on such premises.

It has been found that much of the waste saccharine and fermentable liquids about such establishments, from washing bottles, etc., finds its way into the soil, and moreover such factories are often situ-

ated in a stable-yard, or on other polluted ground. We therefore believe that a serious danger to the public health is liable to exist in the case of all such establishments, where the water-supply is taken from wells on the premises. During the past year, October 15th, 1884, to October 15th, 1885, 760 complaints and nuisances have been investigated. There have been 2,125 inspections and re-inspections of buildings and premises.

Twenty cases of reported contagious diseases have been investigated.

Thirty-two children have been excluded from school on account of contagious diseases.

Thirty-three samples of kerosene oil have been examined, and fifteen samples found to be dangerous.

Since the organization of the Board we have sent 1,707 notices.

Twenty analyses of well-water have been made, and twelve wells condemned and closed.

Much of the ice sold in the borough comes from neighboring ponds, the shores of which have received deposits of garbage and night soil. Two analyses of this ice have been made, but its chemical quality did not warrant an order for its disuse. It is very desirable that protection should in some way be afforded to consumers against the collection of ice from stagnant pools and polluted ponds.

The prospect for an early introduction of the public water-supply is now very encouraging. The street mains are being laid and artesian wells are being bored. Thus far seven artesian wells have been put down by the Water Commissioners, but the quantity of water obtained is insufficient, and other wells are to be sunk.

OCEAN TOWNSHIP. - *Report from* GEORGE. W. BROWN, Jr.

The Board was regularly organized last spring, and has abated all nuisances which have been reported to it, and with much less trouble than in former years. Arrangements are made for a system of sewerage.

OCEAN GROVE. - *Report from* A. E. BALLARD, *Secretary.*

The garbage during the season is collected every day, and taken away a distance of ten miles, where it is either fed to animals or buried. The sanitary condition of every property in the Grove is

carefully inspected before the season commences, and recorded in the minute-book of the Board of Health. The owners are notified of whatever sanitary changes are necessary, and granted a suitable time to make them. If not made by that time, the Board of Health, under the authority of the Association, makes them themselves, and the cost is collected in their regular bill against the property. So far, this has been done without any serious collision.

After this general inspection, an officer is detailed to report anything he can see of an unsanitary character, and the people are encouraged to report any offensive or unhealthy surroundings. No name is given as to who reported, and the system appears to work well. During the winter, all vaults, etc., are examined and cleansed, and their condition reported and recorded. The water is also examined, and in cases where the test of a scum after boiling, or an offensive odor is emitted, the well is changed. The test is not a satisfactory one, but it is the best we can do in cases where the old wells are still used.

Since the last report, the Ocean Grove Association united with some public-spirited citizens of Asbury Park, and drained the meadows lying beyond it, which were becoming both offensive and dangerous from the population which was settling upon them, and from the water pools which stagnated in them. The effect both upon the atmosphere and the waters of Wesley Lake has been good.

At the present time, the Lake Commissioners of Ocean Grove and Asbury Park are engaged in sinking an artesian well at that point where these waters enter the lake, from which they hope to obtain a flow into them which shall send a sufficiently rapid current downward and over the dam into the sea to keep it fresh and pure all the time, and thus avoid the interruption which has heretofore been caused by the necessity of flushing the bottom so frequently with the waters let in from the sea.

During the season, the Association have added ten artesian wells to their former supply. Their depth has been about the same—420 feet. The flow is very slightly less than the first, while the quality is the same as that analyzed under Professor Cook, and pronounced among the purest in the State. Arrangements are being made to sink additional wells at different parts of the grounds where the flow will be conducted in pipes through the streets toward the reservoir of one hundred and ten thousand gallons. The houses along the line

are being supplied from the pipes, and beyond the reservoir supplied from the reservoir, in which will be stored all the night flow. The reservoir will be also used as an aid in case a fire should occur. The arrangements for water from the lakes meet all the needs in this respect, as any house in the Grove is easily reached from them, but this is added to the precautionary means for this purpose.

The sewage system still works without difficulty. There has been but one stoppage of a few hours in the pipes, which arose from the want of water in a large hotel, where the wells had given out, and very little went into the pipes. The difficulty was remedied by forcing water through the pipes, which carried the accumulated matter forward. The sewage is still carried out over 500 feet into the sea, and its continuous flow is uninterrupted. There is never any odor or discoloration over five feet from the point of discharge, and, while the experiment has been a very costly one, the Association feels that it has solved a problem which had been more perplexing than any other. The piling upon which the galvanized iron pipes are carried out, is of iron, and put down in the same way as and by the same man who put down the iron pier at Long Branch and Manhattan Beach. It is believed that they will stand firmly against the tides and wrecks which took away the wooden ones there before.

During the past year there have been 102 sewer connections made, and, as arrangements are being made to extend the sewer system, the health ordinances are being put in a shape which will make connection with it practically compulsory.

SHREWSBURY TOWNSHIP. - *Report from* RICHARD A. SICKLES.

Red Bank has a water-supply owned by the town, a description of which was given in my last report. The pipes have been laid in all the principal streets of the town.

Very few cesspools are cemented; emptied by pumps into tight barrels and carted out on the farms.

This year one hundred and twenty-eight notices have been served by the town Inspector, and in every case the people have complied with the notice without making trouble.

UPPER FREEHOLD TWP. *Report from* H. G. NORTON, M.D., *Sec'y.*

There is no house-to-house inspection in this township.

This spring there was an epidemic of measles of great malignancy,

characterized by severe complications, the disease seeming to increase in severity to the end of the epidemic.

Typhoid fever is prevalent at this writing about Imlaystown.

Four cellars, which had become very foul, and a slaughter-house were ordered cleaned in Allentown.

At Imlaystown station the privy was ordered cleaned, there being in it the accumulations of several years; very offensive in warm weather. Have also had a hog-pen moved from near a well and the spot sown in grass. We think the cases of typhoid fever occurring in this township, scattered as they are, must be owing to defective drainage and want of cleanliness about wells and pumps, many of which evince very primitive efforts to remove water and slops from the doorway and about the well. In most instances the drains only serve to hide the refuse of the kitchen and pump under ground to percolate in time into the well.

It would be a good lesson learned, if people could be brought to understand that slops cannot be carried away from pump-boxes through underdrain tile; where terra cotta tile, cemented at the joints, cannot be afforded, we think a wooden trough on top of the ground the best and most cleanly.

We commend burning as much house refuse, sweepings, (fruit and vegetable parings, in towns,) etc., as possible; to see ashes, sweepings, vegetable parings, etc., thrown into the street points directly to a slovenly housekeeper.

There are some farmers in this township whose hog-pens are too close to the kitchen, but we have been unable to convince them of any danger.

MORRIS COUNTY.

BOONTON. - - - - *Report from* A. E. CARPENTER.

Water-supply is entirely from wells. The wells all seem good, disease never having been attributed to any since the establishment of the village. I have not known of a single case of typhoid during my residence and practice here of eleven years. Dr. Ryerson also says he has never seen a case in twenty-four years' practice originating in the city limits. The wells have not been generally affected by dry weather this season.

The natural drainage is perfect, as the town is principally located

on the side of a hill, and every shower washes the place thoroughly, carrying all surface-matter entirely into the rapid river below. The subsurface drainage is also perfect, as the city is built upon a large sand and gravel hill, with no underlying strata, at least not within two or three hundred feet of surface.

Water-closets are generally situated in back yards. Some are of concrete and water-tight. In one part of the town, concrete water-closets and cesspools are obligatory to the requirement of a deed for property from the real estate owners. The majority, however, throughout the town are mere "holes in the ground," loosely walled up. The city ordinance requires all water-closets and cesspools to be cleaned at least once in two years. The excreta is removed with tight wagons, generally by farmers, and cesspools emptied likewise. I have never known of the water-supply being affected by privies or cesspools in the limits of the town.

Vaccination has been generally neglected during the last six years. The scare from Canada is at present waking people up a little to this important step.

CHATHAM TOWNSHIP. - *Report from* J. N. DEHART, M.D.

The health of Chatham township during the past year, has been much better than that of several previous years. Although malarial fevers prevailed during the spring months in a greater degree than formerly, they were of less severity. Intermittent and remittent fevers were the most frequent, with a very few cases of a typho-malarial or typhoid nature.

The complaints of nuisances, which were caused by badly constructed privies and surface drainage of sinks, have been quite numerous. Some thirty-five complaints have been made to the Board, and all have received personal attention, and been abated as speedily as possible. The question as to what shall be done with the sewage has frequently arisen when these complaints have been made to the Board, but there seems to be no other alternative at present except the digging of additional cesspools.

In taking the school census, inquiries are made as to whether the children who attend school, between the ages of six and eighteen years, have been vaccinated thoroughly, and if any child has not been vaccinated, the parents are told that the child cannot attend school unless he or she has been vaccinated. The sanitary expenses of our town-

ship last year did not exceed one hundred dollars, and that was required principally for printing and publishing the code of health ordinances.

MORRISTOWN. - - - *Report from* JAMES DOUGLAS, M.D.

The high rate of mortality shown by the report of the State Board of Health, as applied to Morristown, is explained by the fact that Morristown has become a sanitarium, and every year there are from six to ten deaths among visitors who have been here but a short time, and in addition to these there are some who pass a few months or a year or two before dying from the disease for which they came to Morristown.

In the early spring of the present year the Board of Health caused a personal examination to be made of every piece of property in the corporate limits, with reference to the size of the premises, number of people residing thereon, water-supply and sewerage facilities, all of which is recorded in a book made for that purpose. A second examination, made later in the season by the Inspector, disclosed the fact that changes and improvements ordered by the Board of Health had been generally complied with.

PEQUANNOCK. - - - - *Report from* E. W. MARTIN.

There has been no disease among animals this year. I was very particular in inquiring in regard to this matter.

There have been no prevalent diseases this year. It has been quite healthy through the whole township.

ROCKAWAY. - - - - *Report from* WILLIAM P. BRYAN.

During the past year there have been no epidemics, and, if anything, a decreased death-rate, owing to the falling off in our mining villages. From these villages all men, who were so situated as to leave conveniently, have gone.

The principal causes of death during the last year have been meningitis and pneumonia, there being eight cases of the former and nine of the latter.

WASHINGTON TOWNSHIP. *Report from* S. W. HANCE, *Secretary*.

I don't think returns of vital statistics are generally neglected. The fault lies in assessors and city clerks. Most physicians and

undertakers and ministers hand returns to assessor or clerk of their own town or township, who place them on their own record, thus making the town and township record misleading. Clerks and assessors should be instructed to mail all returns where they actually occurred, and receive the same fee as for recording. When they refuse, they ought to be fined.

OCEAN COUNTY.

BRICK TOWNSHIP. - - - *Report from* A. W. DOWNEY.

This year a code of sanitary laws were adopted, to better regulate and govern all matters that pertain to or affect the health of the township. It is very evident that much good has resulted from the enforcement of these laws. During the summer and autumn of 1884, an epidemic of typhoid fever prevailed throughout the township, but, during the summer and autumn of the present year, only one or two isolated cases have come under the notice of the Board of Health.

The water-supply of the township is mainly derived from wells, and the strictest attention has been given in order that no privies should be located near the wells. The people have had brought to their notice, through a series of well-timed papers and through the printed sanitary code, the source of all epidemic diseases and the prevention of the same.

The refuse and excreta are made away with nightly in almost all the seaside resorts located within our limits. In Point Pleasant City, deep vaults, entirely impervious, are provided for all the hotels and cottages. At Lakewood, the provision for the removal of refuse and excreta, and all danger therefrom, is not so thorough and efficient. Yet within the next year the Board hopes to correct much that is evil in their system.

All slaughter-houses and abattoirs are prohibited within the limits of any town or village. This rule is strictly enforced, during the summer especially.

Some decided improvements have been perfected in several of our schools during the past year. More space has been provided and better ventilation. Still our school facilities are far from approaching the ordinary standard. In no other line of progress have our citizens

shown themselves so backward as in giving proper provision for the education of the young. However, in this direction there are also indications of an early action looking toward better things.

We earnestly believe that the Board of Health has been more efficient this year than it ever has been before. We feel more the responsibilities of life and death resting upon us, and are more and more resolved to meet these responsibilities conscientiously, and hereafter to have less deaths set down to "the mysterious workings of Providence" that are really due to the neglect of securing proper sanitary precautions.

LACEY TOWNSHIP. - *Report from* MARCUS KENYON, M.D.

Township has been remarkably healthy, with exception of throat and lung troubles in winter and spring, and a few cases of measles.

PLUMSTEAD TOWNSHIP. - *Report from* AARON S. BRONSON.

Sewers are not used in the township, and our cesspools are built with open bottoms, and their contents are carted away very generally and used for agricultural purposes. We have had a few sporadic cases of typhoid fever, but not of a contagious nature, and none fatal. And we have had no epidemic of any kind in the township during the last year, and but few contagious diseases. The Assessor makes due and proper inquiry every year in regard to all contagious diseases among animals, which we have entirely escaped for many years. Slaughter-houses are not complained of as a nuisance.

PASSAIC COUNTY.

MANCHESTER TOWNSHIP. *Report from* WM. D. BERDAN, *Sec'y.*

The most prevalent diseases of the year have been typhoid fever and diphtheria. There have been nine cases of each disease, with two deaths, one with each disease.

PATERSON. - - *Report from* WILLIAM K. NEWTON, M.D.

About 48,000 people use Passaic river water. The remainder of the population use water from wells or cisterns.

It seems hardly necessary to say much about the Upper Passaic river as a source of supply. Its purity is well known, and the State Water Commission, in its report, speaks highly of the water as a source of supply for other cities than Paterson. The water usually has no taste or odor, but occasionally it has an earthy taste and odor. During the warm months, when drawn from the pipes, it is too warm to drink without ice, and often tastes earthy, but it is always safe and healthful. The water-works are owned by a private company. The water is pumped directly into reservoirs, of which there are three—one with a capacity of 8,000,000 gallons, another of 8,000,000 capacity, while the third holds about 3,000,000. A fourth is now building, and when finished will hold 25,000,000 gallons. About 6,000,000 gallons are pumped each day, a large proportion of which is used for manufacturing purposes.

The water remains in the reservoirs long enough to provide for the precipitation of a portion of the suspended matter, such as mud and earth, hence is clearer when delivered than when pumped. There is a constant interchange of the water in the different parts of each reservoir, and as the whole contents of all the reservoirs are completely changed at least once in each seventy hours, there is no danger of the water becoming stagnant, as is the case with water long impounded.

A rigid inquiry has also been made into the condition of the well-water, and the Health Inspector has analyzed the water of all the public wells, and many of the private ones. An ordinance was passed controlling this matter, and the wells are ordered closed when the water is discovered to be impure.

When this Board began the investigation there were 124 public pumps maintained by the city authorities. These wells were situated under the sidewalks, alongside of the gutter, and hence received the leaching from the soil and the soaking from the surface, besides the filth that had escaped into the ground from defective sewers and from privies and cesspools. Of the 124 public wells, the water in 98 was found unfit for use, the remainder were but slightly contaminated, or in some cases showed no evidence of dangerous pollution. The water from 48 private wells has also been analyzed, and 37 were ordered closed.

The following analyses will give an idea of the composition of some of the public wells.

Location.	Free and albuminoid ammonia.	Chlorine.	Nitrates and nitrites.	Nitrogen in nitrates and nitrites.	Oxygen consumed.
Redwoods avenue	Exceedingly large in all cases.	9.71	Heavy traces.	3.41	.122
Jefferson street		11.1	"	3.13	.107
Holsman street		13.1	"	9.08	.13
Jersey street		17.82	"	7.82	.56
Van Houten street		12.8	"	3.91	.26
Ellison street		4.6	"	4.07	.18

The analysis of well-waters is being kept up, and an account kept of these analyses, which will be of service in the future.

About two miles of new sewers have been built this year, and portions of the city not previously sewered have been embraced in this year's work. The Broadway sewer has drained the land and cellars that heretofore were always water-soaked or damp. In our first report we gave all facts concerning the public sewers, and it does not seem necessary to repeat what has been said.

The usual house inspection has been kept up, with the result of abating many nuisances and making improvements. The cellars under many of the older houses are not in a sanitary condition, and the wall is not laid up so as to be water-tight, but in the newer houses great improvements have been made. The Board does not permit basements below the level of the sidewalk to be used for living rooms.

All premises abutting on sewered streets are required to be connected with the public sewer, and all waste must be discharged into the sewer. Since this Board was organized, over 700 houses have been ordered connected with the sewer; this year we have issued 188 orders to this effect.

A new ordinance was passed by the Board relating to sewage, cesspools and privies, and it is now pretty thoroughly enforced.

No cesspools are allowed on sewered streets, and as rapidly as sewers are built, these filth receptacles are ordered cleaned out and filled up.

No privy vault or cesspool is now allowed to be built on premises abutting on a sewered street.

During the past year about 1,100 privy vaults have been emptied with the odorless apparatus.

No contagious diseases of animals have been noted by this Board.

Only one slaughter-house permit has been issued by this Board. This is the only one in the city limits. Much of the slaughtering is done out of the city, or the meat is brought from the West.

A sanitary survey of the 13 public school buildings was made this year by the Health Inspector and the Superintendent of Schools. A report, embracing the heating, lighting, ventilation and other facts, was presented to the Board of Education. As a result of this report, many improvements have been made.

Two ordinances were passed this year, one relating to the water-supply, the other concerning privy vaults and cesspools.

The usual routine work of inspection and nuisance abatement has been kept up. During the year 603 specific nuisances have been abated. Fines to the amount of sixty dollars have been imposed.

Three thousand dollars was allowed the Board of Health this year.

As to typhoid fever, it may be said that many of the cases reported as such are not true enteric fever, but are severe forms of remittent or that bastard disease called typho-malarial fever.

Four of the cases reported in December were in one family and were caused by drinking water from a well into which a drain-pipe leaked. The well was closed. Several other cases were also traced to foul water or to filthy surroundings.

POMPTON TOWNSHIP. - - *Report from* PETER J. BROWN.

The Butler Hard Rubber Company, doing business in Pequannock township, Morris county, has its factory situated so as to take the water from the Pequannock river, and, after using it, it is returned to the same stream. They employ 500 or more hands. Their privy vaults are emptied once a day into the above-named river. The village of Bloomingdale is situated upon the banks of this stream just below, in Pompton township.

WAYNE TOWNSHIP. - - *Report from* RICHARD J. BANTA.

There are five school-houses in the township, all in good condition; there has not been any contagious disease in the schools.

The Board of Health are looking after all contagious diseases.

SALEM COUNTY.

MANNINGTON TOWNSHIP. *Report from* DAVID F. GRIER, *Sec'y.*

Houses mostly occupied by farmers and have cellars under them, and they are dry, except in two colored villages of small houses with no cellars.

No contagious diseases among domestic animals, except the swine plague or cholera has prevailed to an alarming extent in this township since my last report, many persons losing from 60 to 80 per cent. of their entire herd. Efforts are made by the Board to have them buried after death. Some cases, through ignorance and indifference, have been neglected. The disease appears to spread more rapidly in warm weather through the medium of flies, which, we believe, convey it from the diseased feeding-grounds and troughs to the healthy ones. The disease seems to run its course through a herd in about six weeks. In many cases there were individual hogs that entirely escaped, though living with the diseased ones all the time. With suckling pigs and shoats it has carried off 80 to 90 per cent., but larger hogs have fared some better. One case to our knowledge, where a herd of 44 hogs, from 5 to 16 months old, were attacked, the owner began, as soon as he was aware they had it, to feed two tablespoonfuls of carbolic acid in their swill, which was made of middlings and water, just rich enough for them to drink it, and no richer. This was given them three times a day, about 25 gallons each time; about four ounces of copperas a day was also added. They were allowed the run of a field, but had good, roomy sleeping apartments, dry and well-ventilated, which were disinfected daily with about six tablespoonfuls of Little's sheep dip, mixed with about two gallons of rain-water. This treatment was followed up for about three weeks, since which, about one-half the amount of carbolic acid has been fed. The result at this time, after the disease had been in the herd six weeks, is one hog dead, which was the first one taken sick, and was sick five days before any acid was fed; two others a little stiff from the effects of the fever, and the rest as well apparently as ever. The party who treated these hogs believes that by so doing one-half of them escaped entirely, more than half of the balance had it light, and the rest, having good constitutions and good care, also were able to live through it, with one exception. He arrives at the

foregoing conclusion from the fact that every pen of hogs in his neighborhood which had the disease, suffered at least ten times the loss that his did.

PILESGROVE TOWNSHIP. - *Report from* J. M. C. RICHMAN.

Slaughter-houses are inspected so as not to be a nuisance to neighbors.

We have three canning factories, and there has been complaint made to the Board about their emptying their refuse matter into the creek.

Returns are generally promptly made.

Borough lock-up, one cell; prisoners turn in together. Poor ventilation; generally conceded a nuisance.

QUINTON TOWNSHIP. - *Report from* GILBERT A. AYARS.

No prevalent diseases this year. Assessor has diligently inquired in regard to cattle and hogs, etc. Our township almost exempt from hog cholera. Our cattle and horse stock in good, healthy condition.

Slaughter-houses inspected and will be carefully looked after.

Local Board of Health is prompt in bringing up any and every question in regard to health, and we hope, by careful attention, to keep our thriving village of Quinton (population between five and six hundred) in prime health all the year. Hence, we are looking after the storm-water drainage and slaughter-houses and all other points with a sharp eye.

SALEM. - - - - - *Report from* S. L. RICHMOND.

The City Clerk reported nothing different from the previous year, except the outbreak of diphtheria, of which the following brief outline was furnished by F. Bilderback, M.D.:

There have been about 70 cases and 17 deaths. I include in this number, two fatal cases of membranous croup with no pharyngeal deposit; and also one case which occurred early in the epidemic and was not pronounced diphtheria, but which later had pharyngeal paralysis and incomplete paralysis of the respiratory muscles, terminating in rather sudden death from slight bronchial catarrh. The epidemic was confined almost entirely to the town, among the poor who lived in small tenement-

houses. With two or three exceptions, the disease attacked only children; one adult died. Did not seem asthenic. It caused death in every case by invading the larynx. Seemed to be endemic rather then epidemic, that is, was confined to isolated spots on the outskirts of the town; it did not seem very contagious, although it would generally attack all of a family of children, yet there were exceptions notwithstanding. The sick were not separated from the well, as that was impossible. I cannot account for the beginning or ending of this epidemic. The first case occurred in a family that had not been from home. The next in a family that lived about a mile from the first. This family had not been away and had had no visitors. I am not sure that bad hygiene or bad drainage had much to do with it. It would attack one end of a double house and not the other, although both ends would use the water from the same well and were subjected to the same hygienic influences, so far as could be seen. I do not believe the canning factories had anything to do with it. Last March three children died of croup in quick succession in one family. This croup seemed to be contagious or endemic in this house, for it destroyed in succession every child in the house. This house was a double one and had but one well for both ends. This disease might have been diphtheria, but it was confined entirely to this house, and there was no other case of it from that time till this recent outbreak, which began the fore part of this last October or last of September. I think there was a fatal case of diphtheria in one end of the house which had the croup cases last March.

SOMERSET COUNTY.

BEDMINSTER TOWNSHIP. *Report from* WM. P. SUTPHEN, *Sec'y.*

This Board has no extended report as referring to the past year. A notice duly signed was received by the Board on the twenty-fifth day of December, 1884, from citizens of Pluckamin, occasioned by the appearance of diphtheria of a malignant character. Two children died in one family and one in another before the disease could be checked. The Board met the next day and made an examination of the houses and their surroundings, and promulgated an order, by posters in public places, with instructions in accordance with Circular No. 44, of the State Board. The public school was closed one week,

and a quarantine placed upon the children of the town. The result was all that this Board could wish for. The disease ceased to spread and soon abated. The health of the township has been generally good. The condition of our school-houses is perhaps worse, as to health and cleanliness, than any other buildings in the township.

BERNARDS TOWNSHIP. - *Report from* W. PENNINGTON, M.D.

There have been no epidemic nor endemic diseases during the past year. Malaria, at times, shows itself, but only within the confines of the great Morris swamp. Our healthful condition has led a greater number than usual of city boarders to make their summer homes in this township, and particularly about this village. The water is supplied by dug wells and is quite hard, but pleasant to the taste. All sanitary conditions are good.

BRIDGEWATER TOWNSHIP. - *Report from* A. P. HUNT, M.D.

Water-works situated at Raritan. Private company; capital $50,000. Water pumped by water-power and steam-power from the Raritan river, in a stand-pipe 10 feet in diameter, 150 feet high. Used for domestic purposes, also supplied from hydrants in streets for suppression of fires; not used in more than half the houses. A new filtering process has been lately adopted, since which time the water is not discolored in the least, even when the water in river is very muddy, or during a freshet. There is no iron or other taste to the water; it is soft; not bad in any season of the year. Water-pipes are cleaned quite frequently, or when necessary. No sewage above the supply. Examination has been made as to pollution. About half depend on wells, and a few on cisterns with filters. We have an abundant supply from the water-works at all times.

Slaughter-houses are frequently inspected by the Board of Health and kept so as not to be nuisances to neighbors.

A great many nuisances complained of have been abated. Especial pains has been taken as to contamination of wells from cesspools and privies. No new privies are allowed to have deep pits, but are constructed with boxes for emptying the contents, and many of the old ones have been ordered filled and so arranged that surface-water cannot enter them. The quality of the water in wells has been very much improved.

HILLSBOROUGH TWP. *Report from* W. H. MERRELL, M.D., *Sec'y.*

There is an increasing intelligence in sanitary affairs. Vital statistics are recorded by assessor.

For the past two or three years malaria has been much less prevalent than formerly, and this year scarcely any has existed. During the winter sporadic cases of pneumonia occurred.

During the summer a severe epidemic of whooping-cough prevailed. Several had it then who are very confident they had had it before. And some who had before had it, became tormented with a severe paroxysmal cough lasting for weeks, but did not get the whoop.

During the summer there was a marked increase in the amount of dysentery over previous years.

MONTGOMERY TOWNSHIP. *Report from* WILLIAM OPPIE, *Sec'y.*

We have three slaughter-houses in the township, and they are very nicely kept.

Our school-houses are in good condition, and the ventilation is fair.

I have visited the entire township this summer, and am pleased to report the general good condition of the same.

Malaria, which threatened us in former years, has mostly disappeared.

SUSSEX COUNTY.

ANDOVER TOWNSHIP. - - - *Report from* G. C. COOK.

Water-supply from wells and cisterns. Wells are all hard water, and furnish greatest supply of water. Some depend entirely upon cisterns for their supply of water.

No system of drainage. Cellars usually dry. Population of the village of Andover near three hundred. No sewers of any extent.

Houses all have cellars or basements. Cellars generally used for storage of vegetables. No tenement-houses with more than two families. No annual inspection of houses.

No prevalent diseases to report. General health has been good; but few deaths in the township. Population, 1,014. Have made general inquiry as to diseases of animals. None to report except one case of hogs, where six, in a pen of eight, died, attributed to over-feed.

No slaughter-houses complained of. One meat market has caused

some complaint as being very offensive to the smell at different times during the summer season, from the proprietor's carelessness and neglect to remove the accumulation of stale meat, etc., and allowing his place of business to become filthy.

Our Board of Health is only on paper, no interest being taken in sanitary matters, from the fact, I suppose, that nothing of any serious import has visited our township injurious to the general health.

SPARTA TWP. - *Report from* THEOPHILUS H. ANDRESS, M.D.

It has been very healthy during the last year. No epidemic diseases whatever, and malarial difficulties being less prevalent by far than for preceding years.

One thing I might add, viz.: Our school building is very deficient in regard to ventilation. It has been my zeal to have it properly ventilated, but my attempt was voted down by the district.

STILLWATER TOWNSHIP. - - *Report from* C. V. MOON.

The Board of Health of Stillwater, Sussex county, N. J., held a meeting at Swartswood, a small village at the north end of Swartswood lake, in Stillwater township, on the 5th of September last, a complaint having been made to the Board from that village with reference to a tannery, situated on a small stream of water, one and a half miles north of that village. The complaint was that the refuse of the tannery being thrown into the stream was the cause of sickness in the village. An examination of the tannery by the Board revealed the fact that twice a year the contents of the lime vats are pumped out into the stream. The green hides are placed in the "limes," so called, to loosen the hair and fleshings. The hair is removed and sold; the fleshings are removed and dried, and sold to manufacture glue. It is a question whether strong lime-water is deleterious to health in causing disease. The supposition is that it is not. We found that spent tan-bark was allowed to float down the stream.

In connection with the tannery, we found a privy seat just on the bank of the stream. We ordered that nuisance removed. A mile further up the stream we found a man in the business of making cider, and much of the pomace found its way in the stream. We ordered that abated. A part of the village of Swartswood is located on a low, gravelly drift, in which the water of the stream settles in

dry weather, and the water of the wells located there no doubt is unhealthy. We found a cesspool much too near a well, and ordered its removal. The most of disease prevalent in that vicinity was simple intermittent fever.

About the usual amount of cases of intermittent fever have been prevalent; more numerous during the summer months.

WALPACK TOWNSHIP. - - *Report from* MARTIN HULL.

The Township Physician quarantines and disinfects houses which have contagious diseases. Only a few cases of scarlatina occurred in the last year, communicated to patients by clothing. Vaccination has been performed on a greater portion of the inhabitants.

WANTAGE TOWNSHIP. *Report from* NELSON DEWITT, *Secretary.*

Much of the low-lands have been drained, and some of them are productive, but the most are covered with wild grass, and used for pasture during the driest part of the season. The sewerage is quite extensive in the village of Deckertown, and is in good condition.

The Board of Health during the past year have been on the look-out, and, by persuasion, have had a general cleaning-out out of all places that seemed at all dangerous to the health.

UNION COUNTY.

CLARK TOWNSHIP. - *Report from* WILLIAM J. THOMPSON.

There are no prevalent diseases or slaughter-houses in the township. No resident physician and no public cemetery. The local Board of Health supervises matters and acts promptly in all cases brought to its notice.

ELIZABETH. - - - - *Report from* A. R. REEVE.

There are thirty-seven miles of sewers, brick and pipe, which empty partly into the Newark bay and Staten Island sound, and partly into the Elizabeth river.

The Elizabeth river has been cleaned and deepened in the center during the past year as a sanitary measure, in accordance with sug-

gestions kindly made by the Secretary of the State Board. Results promise to prove beneficial.

Refuse removed two and three times a week by public scavenger, as directed by Board of Health and Street Commissioner, and used in filling up low-lands near meadows.

Burials permitted only on certificate of City Clerk. Private burials in church-yards within the city limits almost entirely done away with.

FANWOOD TOWNSHIP. *Report from* F. W. WESTCOTT, M.D., *Sec'y.*

The Assessor inquires each year as to losses of animals and contagious diseases, and states that no contagious diseases have been known in the township during the past year.

Slaughter-houses in our borders have been conducted so as not to prove a nuisance to the neighbors.

I know of but four cases of diphtheria in the township during the past year, but during January scarlet fever was quite prevalent in Scotch Plains, and of a malignant type. The Board of Health promptly closed the schools, and rendered efficient aid in quarantining the families, disinfecting and cleaning all places not in proper condition.

LINDEN TOWNSHIP. - - *Report from* JOHN A. ETHERIDGE.

Our township has been remarkably healthy this year, only a few cases of scarlet fever, and every precaution was taken to prevent the spread of the disease. There has been very little malaria this year, I may say less sickness this year than formerly.

We have made some improvements the past year in sewerage, and shall continue doing so as fast as we conveniently can.

PLAINFIELD. - - *Report from* WILLIAM C. BOONE, M.D.

The source of the water-supply is exclusively from wells, either dug, driven or drilled. The quality of the water is excellently pure, and in never-failing abundance. The average level of this subterranean supply is about sixteen feet below the general surface of the ground.

There is no established system of sewerage, with the exception of a limited extension of pipe from the lower part of North avenue to

Green brook stream, and the house refuse-water is, as a general thing, discharged into private cesspools, built mostly with open bottoms and loosely-stoned sides, eight feet in depth as an average; in some few instances with cemented walls and bottoms. These cesspools are emptied at the discretion of the owner or tenants, and at very irregular intervals. Outdoor privy vaults are numerous, and they do not get that careful attention which is necessary for the best sanitary condition of the localities in which they are situated.

Garbage, with ashes and other house refuse, is collected daily by house-to-house visitation of parties contracting for its removal at so much per barrel or load, and is deposited outside the corporation limits, to be used as fertilizing material, and to fill up inequalities in lots and marshy places.

The privy vaults and cesspools are mainly cleansed by the use of the odorless excavating apparatus.

The school-buildings are large, elegant and expensive, intelligently designed for healthfulness, safety of their inmates and convenience of pupils and teachers. These buildings possess most of the modern improvements that the tests of time and experience have approved, for ventilating, heating, lighting, drainage and other necessary sanitary arrangements, and are typical exponents of what an enlightened and liberal system of education can accomplish in the promotion of knowledge, with due regard also to the health and comfort, safety and convenience of all connected therewith.

The state of health of Plainfield during the past year has been highly satisfactory, with the exception of two instances of deterioration of the public health, which we deem it our duty to report.

One of the above exceptions has reference to the prevalence, in June, July and August, of a large number of cases of inflammatory diarrhea and dysentery, in adults mostly, of which a few proved serious and troublesome.

The second instance of deterioration of the public health may be noticed in the prevalence of a number of cases of typhoid fever, in the months of July, August and September. A city ordinance makes it obligatory for any physician practicing here to report to the Board of Health all casses of a contagious nature. From these reports we learn that eight cases of typhoid fever have occurred in our city during the above-named months. As this is claimed among the preventable diseases, it should exist only in the least possible degree;

and its recent development in certain quarters of the city furnishes but another proof of the well-known fact that filth and poverty supply a readier breeding-place for the germs of this disease than locations in which hygienic rules are observed and carried out. For all these cases reported have occurred in those streets of the city which are conspicuous by the utter neglect of cleanliness and of sanitary observances by the dwellers therein.

There have been some cases of malarial fever, probably a slight increase in number since last year, but not attributable, in the opinion of the Board, to any faulty sanitary condition here, as a careful inquiry reveals the fact that most of the cases have been brought to us by persons who have been residing or sojourning in other localities.

We cannot pass by, without dereliction of duty, another large danger to the general health of the city from the imperfect system of drainage which exists in a certain part of the city, viz.: The emptying of the Park avenue and Peace street sewers, as well as of the surface drainage of the streets and gutters (in some instances with suspected water-closet connection with the above-named sewers), into slack water—the two small streams, Green brook and Cedar brook, which course through the city on either side.

It will be readily seen that the deposit of animal and vegetable matter, the refuse of a large portion of the city, must contain elements formidable to health. When, therefore, these streams are very much reduced by drought, and exposed to the sun with their bottoms covered with filth and decaying matters, there necessarily obtains a most unwholesome state of affairs. There can be no doubt that the influence upon the public health is such as to favor the development of specific causes of disease.

SPRINGFIELD TOWNSHIP. - - *Report from* W. B. STILES.

Only one complaint of nuisance has been reported to the Board this season, which was abated soon after the parties were notified and ordered to remove it.

SUMMIT TOWNSHIP. - - *Report from* W. F. EDWARDS.

Houses generally have cemented cesspools and are emptied with a sanitary wagon, closed tight. The contents are taken to remote parts and either plowed under ground or disinfected.

The Board of Health have ordinances for the preservation of health which are strictly enforced.

There have been no prevalent diseases during the year.

UNION TOWNSHIP. *Report from* D. HOBART SAYRE, *Secretary.*

Malarial fevers not as prevalent as in past few years. Diphtheria in one locality caused death of five children in two families. Preventive measures stopped disease from spreading.

Complaints of nuisance in one part of township, caused by discharge of sewage and waste-water in a water-course, was made to us. The Secretary of State Board was notified and made personal inspection, and rendered efficient aid and advice in abating the nuisance. The parties complained of were notified that the penalty of the law would be enforced unless the nuisance complained of was at once abated.

WARREN COUNTY.

FRELINGHUYSEN TOWNSHIP. - *Report from* F. RORBACH, M.D.

The refuse is mostly fed to pigs and chickens, but in some cases is thrown outside the kitchen door, a custom to be deprecated.

During the past year the amount of sickness and disease has been quite up to and, I think, a little above the average of the three previous years. We were again, for the third consecutive year, visited by an epidemic of scarlatina, which commencing early in January lasted until about the middle of April. The cases numbered sixty-two, but were of milder type than those of the previous two years, and none was fatal. There was an unusual absence of sequelæ; albuminuria and dropsy occurring in five, and otitis in two cases only. The total number for the last three years was 181, of which four were fatal. Following the scarlatina, sixteen cases of measles, all of mild type. During the winter and spring pneumonitis was unusually prevalent and severe.

Malarial fevers of all varieties were much less frequent than in former years, and I have to report only two cases of typhoid, neither fatal, the mineral acid treatment being employed. Also, only three cases of diphtheria, only one severe, and all recovered. In August and September, intestinal diseases, *i. e.*, cholera-morbus and infantum, catarrhal enteritis and dysentery were quite prevalent.

GREENWICH TOWNSHIP. - *Report from* WILLIAM SHERRER.

Excepting five cases of scarlatina early in the summer we have had no special disease. The all-prevailing disease (intermittent fever) is, during the summer, common with us.

HARMONY TOWNSHIP. - *Report from* JOHN K. VANATTA.

The school-buildings, except two, are in a poor condition. They are in bad repair, small and poorly ventilated.

The public health has been good. Measles prevailed from April to July; no deaths occurred.

HOPE TOWNSHIP. - *Report from* E. J. BERGEN, M.D., *Sec'y.*

The Board of Health for this township have little to report; only once the past year has it been necessary to call the Board together to abate a nuisance, which was promptly done.

The past year has been one of unusual good health among the people, only two cases of typhoid fever have been observed, one doubtless due to an untrapped cesspool, allowing gases to enter the house, but the cesspool remains in the same condition, probably to cause more sickness. There are malarial diseases among us at all times, but of a mild type. Our school-houses are in fair sanitary condition, although the out-houses are filthy. The attention of the trustees was called to their condition, and no doubt they will be attended to. Probably one-half of the children are not vaccinated, and unless there should occur cases of small-pox doubtless will remain so.

LOPATCONG TOWNSHIP. *Report from* JEREMIAH YEISLEY, *Sec'y.*

The Board of Health attended to the sanitary affairs, and in all cases where nuisances were reported to them they have had them abated. There have been no prevalent diseases during the year, and although the death-rate is much higher than that of the preceding year, this may be accounted for by the death of quite a number of aged persons, and two suicides, which will cut it down to that of the former rate. There has been no prevalent disease among any of the cattle.

OXFORD TOWNSHIP. *Report from* L. B. HOAGLAND, M.D., *Sec'y.*

Our water-supply is from wells, cisterns and springs. The former are, for the most part, well situated, and are kept in good condition

by being periodically cleaned. The springs, too, are mostly well located, except one in particular, in the town of Oxford, from which a number of families occupying the Oxford Iron and Nail Company's houses are obliged to obtain their drinking-water. This is so situated that during heavy rains a large amount of surface-water necessarily runs into it, and at the same time carries considerable filth with it. The Board of Health have notified the company, and have suggested means by which the matter could be remedied, but thus far they have paid little or no attention to it. We will try moral suasion for a while yet, and then see if legal suasion won't have a better effect.

Among the company's houses in Oxford, many have wet cellars, owing to the bad location of the houses and the springy condition of the soil in their vicinity.

Malaria is quite prevalent among us. In fact, almost every disease met with presents, in one way or another, the characteristic periodicity of malaria. There is a large area of reclaimed swamp-land near the town and also a mill-pond, which probably give rise to it.

Whooping-cough has been quite prevalent in the township during the spring and summer months, with a few deaths from complications.

PHILLIPSBURG. *Report from* P. F. BRAKELEY, Jr., *Secretary.*

The water-supply is furnished by the Lehigh Water Company, of Easton, Pa., a private corporation. The water is sometimes discolored by heavy rains, but generally is perfectly clear and of a good quality. It contains a slight trace of iron and lime, but not in such quantities as to affect the natural softness of the water. The stream from which the water is supplied receives a limited amount of sewerage at a point eighteen miles above the location where the water used is obtained. About one-third of the population is supplied in the above manner, the balance depending chiefly on cisterns.

As a general rule cesspools are not cemented; some are walled at the bottom and sides, others are simply dug in the earth. Cesspools are emptied by the contents being pumped into barrels which are air-tight, and conveyed out of the town limits, there prepared and afterwards used as a fertilizer.

There is not a slaughter-house within the limits of the town, consequently the inhabitants are not annoyed by anything that might be caused by them.

WASHINGTON BOROUGH. - *Report from* C. S. STRADER, *Sec'y.*

The general health has been very good. No contagious diseases have visited us, and malaria, though existing, has not assumed a general character.

Slaughter-houses, which have caused some former trouble, have been kept clean. Hogs, as a general thing, are not kept in the borough limits. There has been no disease among horses, cattle or fowls.

Streets have been kept clean and well sprinkled.

The water-supply is from the Water Company's works and cisterns.

REPORT OF THE COMMITTEE OF ANALYSTS TO THE STATE BOARD OF HEALTH.

INTRODUCTORY REPORT BY PROF. ALBERT R. LEEDS, CHAIRMAN.

During the past year the work of the Committee has been prosecuted as far as the scanty material submitted to them by the local Inspectors would permit, and as far as opportunity was afforded them of studying the methods of analysis to be pursued in the examination of the articles of food, etc., officially submitted to them. In this relation, I would call attention to the valuable paper by Prof. H. B. Cornwall and Mr. Shippen Wallace, members of this Committee, upon "Reichart's Method of Butter Analysis." The writer has himself been more particularly engaged in the examination of malt foods, of infant foods, and in the water-supplies of our cities.

EXPERIMENTAL WATER ANALYSIS.

In the latter connection he has had occasion to propose the addition to the method of chemical analysis now in use of a method of experimental analysis. It would occupy too much space to give the details and results of the method in this place, and the reader is referred to my report to the Special Commission appointed by the State of New York to recommend a new water-supply for the city of Albany, and to the Journal of the American Chemical Society. Briefly stated, the method is as follows: The water under examination is submitted to complete chemical analysis, including a determination of the dissolved oxygen and other gases. It is then purified by oxydation and destruction of the dangerous organic and organized matters which it contains. The fact of this destruction is ascertained by biological analysis to see what, if any, micro-organisms are left behind in the water after purification. Then the water is again chemically analyzed, and the amounts

of dangerous matters which have been removed in order to effect a purification, give the coefficient or index of impurity in the original waters. As an illustration of this method, I may mention the case of the water-supply of the Insane Asylum at Morris Plains. At the time of the outbreak of typhoid fever in that institution, it became necessary to ascertain whether the drainage and sewerage of the institution could be purified in such a manner as not to be a source of danger when allowed to flow into the water-courses in the vicinity. A sample of the drainage waters was first analyzed, then it was purified, and the resulting perfectly clear, limpid and pleasantly-tasting water was again analyzed in the manner indicated. From a water originally foul and dangerous, a water can be obtained which is pure, and from which pathogenic micro-organisms are absent, and the differences, as established by analysis of the water before and after purification, are those which are most important to know, and which are spoken of above as affording us the coefficient index or measure of impurity.

INFANT FOOD.

In a former contribution upon this subject the author gave the analyses of the various articles of infant food at that time in use, and gave as a final result of their examination the conclusion that the most satisfactory article of artificial infant food was cow's milk. Not cow's milk, however, just as taken from the cow, but so modified that the ratio between its several constituents and the nature of its albuminoids or caseine should be so modified that the modified cow's milk, or "humanized milk," should be the equivalent both chemically and physiologically of woman's milk.

The main difficulty is to obtain good cow's milk to begin with, since the physician employs both of these in the writing of the formula for preparing the "humanized" milk, and if it is impure or watered or skimmed the desired equivalency in the composition of the "humanized" to human milk cannot be so exactly attained.

The method has now been successfully pursued in many thousand cases. The reasonableness and propriety of starting with pure cow's milk as a basis has been admitted on all hands, and the further advantages of modifying the cow's milk, so as to make it equivalent in composition to woman's milk, have been abundantly confirmed by

medical practice. Unfortunately the success of this method has led to the production of other articles of food which are advertised as containing the same constituents as human milk, but which are in reality farinaceous preparations similar to the milk-foods of which I gave an extended account and analysis in previous volumes of these reports.

Of such a nature is a tasteless flour-like powder, sold as Carnrick's Soluble Food, or Milk-Wheat Food. The information contained in the statements made by the manufacturers concerning it are sufficient to show the crude and imperfect manner in which they have appropriated the literature of the subject. For it is stated that "The analysis of this prepartion will show that its constituents are almost identical with an average sample of human milk, its formula being: fifty per cent. of the solid constituents of milk (the caseine being brought to a soluble condition by means of pancreatine); fifty per cent. of wheat (the starch of the wheat being converted into the soluble form of dextrine and maltose)."

It would appear almost unnecessary to say that such a preparation cannot possibly be almost identical with human milk, when it is stated to contain fifty per cent. of dextrine and maltose, neither of which substances are present in human milk.

The analysis of this "milk-wheat" food shows that the name is a correct one, and that whilst it contains the constituents proper to a milk-food, the statement that it is almost identical with an average sample of human milk is absurd. I add an analysis of the American-Swiss Milk Food, and the average composition of milk-foods in general for comparison:

MILK FOODS

	Carnrick's.	American-Swiss.	Average.
Water	3.42	5.68	7.50
Fat	7.45	6.81	5.50
Albuminoids	10.25	10.54	13.25
Soluble Carbohydrates	27.08	45.35	45.00
Insoluble Carbohydrates	37.37	30.85	25.00
Ash (saline constituents after ignition),	4.42	1.21	2.25

The peculiar and inexplicable feature in the composition of the Carnrick's food is the enormous percentage of ash. How very large it is will be seen on comparison of the analysis of the ash of many

samples of condensed milk and of wheat-meal, the former containing on an average 2.6 per cent., the latter 0.75 per cent. of ash. To discover to what this great excess of saline matters is due, an analysis was made with the following results. I quote analyses of the ash of milk and wheat for comparison (Königs, Nahrungs and Genussmittch):

	Ash of Milk.	Ash of Winter-Wheat.	Ash of Milk-Wheat Food.
Sodium Monoxide	9.70	2.25	16.74
Potassuim Monoxide	24 67	31.16	11.16
Calcium Oxide	22 05	3.34	27.07
Magnesium Oxide	3 05	11.97	5 02
Ferric Oxide	0.53	1.31	Trace.
Phosphoric Anhydride	28.45	46.98	22.34
Sulphuric Anhydride	0.30	0.37	2.29
Silicic Anhydride	None.	2 11	0 54
Carbonic Anhydride	None.	None.	7.79
Chlorine	14.28	0 22	9.09

These analyses reveal a great excess of soda in Carnrick's food, which must have been artificially added in the form of carbonate of soda, as is shown by the carbonic anhydride present in the ash of the milk-wheat food and absent in that of wheat and milk.

This addition gives a persistently alkaline reaction to the food, and is tantamount to the giving of a dose of carbonate of soda to the infant on every occasion when the food is used. There is a similar great excess of sulphuric anhydride, due to the inexplicable presence of a large amount of sulphates. These excesses are made up by a corresponding deficiency in the salts of potash, a most unfortunate blunder, inasmuch as these potash salts are vital to infant nutrition.

I have written thus explicitly of Carnrick's soluble food, for the same reason that I spoke severely in a previous report of Savory's and Moore's food. The latter, whilst claiming to be prepared in accordance with Liebig's principles, was actually in point of composition and preparation in opposition to them. And the former, whilst claiming to afford a food of similar composition to woman's milk, is in reality a wheaten milk-food, similar in composition to milk-foods hitherto prepared, except in the very large proportion of its saline constituents, and in the artificial addition of an excessive and injurious amount of carbonate of soda.

CONDENSED MILK.

A somewhat similar literature has been promulgated in reference to the substitution of condensed milk, properly diluted, for human milk. It has been stated that in the process of condensation a certain amount of modification is effected which renders the diluted condensed milk more readily assimilable than cow's milk in its natural condition, before condensation. And, furthermore, that by the condensation of cow's milk, especially rich in cream, a condensed milk can be manufactured which affords on dilution a milk similar in the ratio of its constituents to woman's milk.

Neither of these statements are true, and the attempt to realize them in practice has been attended with failure. This was notably true of the so-called "Special Cream Brand" of the Romanshorn condensed milk, extensively alluded to in the medical journals during the spring of the present year. It was contained in glass bottles, to do away with the objection arising from the use of tin, and was of a yellow color with thick, creamy consistence. I give its composition, first, as determined upon the original sample; secondly, when diluted ten and a half times; and compare both of these with the averages of cow's and human milk, which I have given in previous annual reports of this Board.

ANALYSIS OF ROMANSHORN SPECIAL CREAM BRAND CONDENSED MILK.

	I. Romanshorn Special Cream Brand.	II. The same, diluted 10.4 times.	III. Average commercial milk.	IV. Average woman's milk.
Water	54.21	95.61	87.7	86.73
Fat	13.60	1.30	3 75	4.13
Albuminoids	15.06	1.44	3.42	1.99
Sugar	15.24	1.46	4.42	6.94
Salt	1.89	0.18	0.64	0.20

From these analyses it is evident that the special cream-brand, especially prepared, as it was stated, for the use of infants, did not yield by dilution a milk in which the ratio of the constituents was the same as in human milk.

On keeping a short while after opening the bottle, this condensed milk became very offensive. Moreover, much of it spoiled before opening the bottles, and for these various reasons the project failed disastrously.

CONDENSED PEPTONISED MILK.

A proposition which has more in its favor than the employment of milk prepared by direct condensation, is that of first peptonising the nitrogenous constituents of the milk, and then condensing it. The difficulty in carrying the method into practice appears to be in obtaining a condensed product which will keep indefinitely without change, and one which will not acquire a more or less bitter taste and a darker color than ordinary condensed milk. The difficulty has in one sense been overcome by the addition of a very great excess of cane-sugar to the milk in process of condensation. By means of this addition, a thick syrupy liquid is obtained without carrying the condensation nearly to the point which otherwise would be requisite. Moreover, the keeping qualities of this syrupy condensed milk are, as may readily be supposed, almost perfect. Some open cans stood in my laboratory for six months without any serious alteration in their contents. The surface of the milk became covered with a crust, upon which well-defined crystals of cane-sugar were formed by process of evaporation, but the liquid appeared quite unaltered and palatable. I give an analysis of some milk of this description, prepared by Savory and Moore:

	Condensed Peptonised Milk.	The same, diluted 6.8 times.	Average woman's milk.
Water	15.32	87.76	86.73
Fat	13.95	2.02	4.13
Albuminoids	7.16	1.03	1.99
Cane-sugar	55.54	8.05	......
Milk-sugar	5.20	0.75	6.94
Ash	2.65	0.39	0.20

It will be seen from this analysis that the diluted condensed peptonised milk is in no sense a substitute for human milk. Out of 12.24 per cent. total solids in the sample of such diluted peptonised milk analyzed, 8.05 per cent., or much more than one-half, is cane-sugar, which does not exist in human milk. The ash was large in amount and was alkaline from the presence of alkaline salt, added to the milk in the process of condensation. The fat, albuminoids and milk sugar were as largely deficient as the cane-sugar was excessive in amount. From these considerations the injury and defective nutrition resulting from the substitution of such diluted condensed milk for human milk, are readily apparent.

BIOLOGICAL ANALYSIS OF MILK.

It is evident that in the course of inspection of commercial milk, much milk that is capable of originating disease, either from the fact of having polluted water added to it, or from having been derived from diseased cows, escapes detection. This unfortunate state of affairs has been illustrated in the case of a sample of milk which was suspected to have been the cause of sickness in the family using it. The milk was brought to me as having been obtained especially from the milk of one cow, and as being of superior excellence. It proved to be entirely abnormal in composition, having a specific gravity of only 1.0246 (corrected), with 21.28 per cent. of total solids, of which 13.95 per cent. was fat and 0.94 per cent. of saline matters.

On examination under the microscope great numbers of colostrum and pus corpuscles were apparent. It was then submitted to biological experiments in sterilized culture tubes, when large numbers of bacteria were discovered to be present. The use of the milk was promptly discontinued. How large a quantity of similarly affected milk finds its way into the market it would be difficult to say, but the employment of biological methods in the examination of milk would unquestionably be of the greatest service in its detection.

ANALYSIS OF ASH OF ABNORMAL MILK.

Had I obtained a milk containing 0.94 per cent. of ash in the ordinary course of inspection of commercial milk, I should have deemed it wise to examine the ash for foreign substances, inasmuch as 0.94 per cent is much above the average. I find a limited number of analyses in which as high or even higher percentage of ash is given, but know nothing of the physical condition of the cows from which the milk was taken. In the present instance there was considerable ulceration of the udder, due to improper milking. I give, for comparison, the minimum and maximum results obtained in the analysis of four samples of milk, presumably normal, by R. Weber and Haidlen:

	Ash Normal Milk. Minimum.	Maximum.	Abnormal Milk.
Potassium Monoxide	17.09	33.25	17.02
Sodium Monoxide	8.60	11.18	7 88
Calcium Oxide	17.31	27.55	32.75
Magnesium Oxide	1.90	4.10	1.07
Ferric Oxide	0.33	0.76	......
Phosphoric Anhydride	27.04	29.13	25 72
Sulphuric Anhydride	(0.30 per cent. mean.)		3.03
Chlorine	9.87	16.96	12.15

From this analysis, the abnormal milk would appear to be deficient in alkalies and iron, and excessive in regard to lime and sulphuric acid. It should be added that whilst its smell was normal, it had an acid reaction and the taste of scalded milk.

REPORT OF PROF. H. B. CORNWALL, MEMBER OF THE COMMITTEE OF ANALYSTS.

Prof. A. R. Leeds, Chairman Committee of Public Analysts:

DEAR SIR—I have the honor herewith to transmit to the State Board of Health, through you, my report of work done during the year as a member of the Committee. I have examined a sample of kerosene, received from Dr. William K. Newton, Paterson, which flashed at 100.7° Fahr., and another from Inspector McGuire, Trenton, which flashed at all ordinary temperatures, and was simply benzine. It was said to have been sold by mistake.

A specimen of "Eier-nudeln"—egg noodles—was sent to me by Dr. Newton. It was suspected to be colored with yellow chromate of lead, and did indeed contain an exceedingly minute quantity of that pigment, chrome yellow. The quantity was, however, quite too small to have any effect on the color of the noodle. It may have been the residue of a larger dose originally used, some of which remained in the kneading trough when the batch of noodle was made, from which my sample was sent. This seems the most reasonable explanation of the fact that the chrome yellow seemed to be pretty evenly distributed through the sample, but in so small quantity as to preclude the idea that it was purposely added.

The most important part of my work has been spent in preparing, together with Mr. Shippen Wallace, the paper on "Butter Analysis," accompanying this report.

REICHERT'S METHOD OF BUTTER ANALYSIS.

BY H. B. CORNWALL AND SHIPPEN WALLACE

The analysis of butter may seem a well-worn subject, but increasing experience with existing methods shows, as in the case of the analysis of milk, that the methods and standards are not yet as perfect as might be desired.

It was determined by the Committee of Public Analysts, in view of the importance of a reliable method of butter analysis, to subject Reichert's method to a careful series of tests, and we were requested to prepare the results for publication.

The method in question was discussed, in connection with the general subject of butter analysis, in the report of the New Jersey State Board of Health, 1884. Since that time some new facts have been published relating to it, which are now deemed worthy of presentation.

It will be well to repeat here the directions for performing the analysis, as abstracted (in the report alluded to) from Reichert's original article in Fresenius' *Zeitschrift für Analytische Chemie*, 1879, p. 68; because none of the descriptions which we have met with among English translations possess the desired accuracy of detail. As will be seen, the method must be performed under fixed conditions (very easily attained), and it is greatly to be desired that Reichert's original and very simple directions might be followed by all who make the test.

The fat to be tested is melted, best on a water-bath, any water allowed to settle and the fat filtered through good filter paper or cotton. If not perfectly clear it must be filtered again. Then 2.5 grammes of the liquid fat are weighed in a flask of about 150 c.c. capacity, Erlenmeyer's form being best. (The size of the flask is probably of some importance, as influencing the subsequent distillation.—*Abstractor.*) One gramme of solid caustic potash and 20 c.c. of alcohol (80 per cent. weight) are added, and the whole heated to gentle ebullition on a water-bath, with frequent agitation, until the mass is no longer slimy. (The alcohol must all be removed, leaving the soap nearly dry.—*Abstractor.*) Afterwards 50 c.c. of water is added to dissolve the soap, and when *completely* dissolved the soap is decomposed with 20 c.c. of dilute sulphuric acid, (1 of pure, strong acid to 10 of water, by volume,) which is poured into the flask. The latter is then distilled with moderate boiling, until 10 to 20 c.c. has passed over into a 50 c.c. flask placed to collect the distillate, which must first pass through a small wet filter to retain any insoluble fatty acids that come over with the steam. The 10 or 20 c.c. are returned to the first flask, and the distillation is now continued until exactly 50 c.c. have come over. This is then *at once* titrated with decinormal alkali solution (Reichert used decinormal soda). He used also litmus as an

indicator, adding the alkali until the blue color was permanent for some time. We find that phenolphthalein gives identical results, as has been also stated by others. Reichert's device for preventing bumping was by a gentle current of air, but Caldwell found (Report of the Board of Health of New York, 1882,) that two or three bits of pumice stone attached to platinum wire spirals served the purpose admirably, and we use this device.

It will be seen that Reichert's method is a strictly comparative one, and must not be arbitrarily altered. Slight variations (scarcely to be avoided) in the weight of the solid potash, or the strength of the alcohol, are not important; but the great license which some operators have apparently allowed themselves is to be deprecated, to say the least. There is always a smell of escaping butyric ether at first, when true butters are being saponified, but careful experiments under an inverted condenser have shown us that no essential loss of butyric acid is thus occasioned. Duplicate tests by Reichert's method, as above described, have always been very satisfactory.

One important point should be noted: A blank test with the alcohol and potash should always be made, to determine how much of the acidity of the distillate from the tested butter is really due to volatile fatty acids.

Reichert admits that his test needs further trial, and invites the same. He concluded that the distillate from pure butter would require an average of 14 c.c. of decinormal alkali, and never less than 12.5 c.c. A very large number of tests by many chemists have now been published, all made essentially according to Reichert's method. His lowest limit of 12.5 c.c. has not been absolutely confirmed. Sendtner especially (Wagner's *Jahresbericht*, 1883, p. 979,) obtained results that would indicate 12 c.c. as a better limit, while he considered that a butter requiring even 11.5 should not be unhesitatingly condemned.

Beckurts (Wagner's *Jahresbericht*, 1883, p. 978, an abstract from *Pharm. Centralhalle*, 1883, p. 557,) proposed, on the other hand, to raise the limit, since he consumed 15.6 to 17.5 c.c. of decinormal alkali. Wagner does not state how many butters Beckurts tested, but if he found such high figures in many different cases, his results are certainly unique and, in our present knowledge of the subject, do not warrant raising the standard.

Munier, on the other hand (Fresenius' *Zeitschrift*, 1882, p. 394), proposed to lower the standard very much. He deviated in several

particulars, however, from Reichert's method, and his results have been either rejected or severely criticised, especially by Sendtner (*loc. cit.*) and by Reichardt (*Archiv der Pharmacie*, 222, 1884, p. 93), as already stated in the New Jersey report, above mentioned. Within the past year, also, reports of other chemists have been published, and none of them support Munier's view, which was that the proportion of volatile acids obtained by Reichert's method varies with the seasons of the year. From his own results he proposed that the standard should be made 10 c.c. of decinormal alkali from October to March, 12.1 c.c. from March to May, 12.4 c.c. from May to August, and 11 c.c. from August to October. His figures range from 9.2 c.c. (in December) to 14.5 c.c. (in April).

There are a few strange features connected with Munier's results which render us unwilling to accept them without further confirmation, apart from the important alterations of method which he introduced and which were fully described in the New Jersey Report for 1884, already cited. In the first place, although he reported one butter as consuming only 9.2 c.c. of decinormal alkali, in December, yet he apparently placed little confidence in the result, since he only proposed to lower the standard even for December to 10 c.c. Secondly, his figures are, for the most part, very low, as compared with all other observers. The highest is 14.5 c.c.; only in three cases out of the whole sixty-six did he exceed 14 c.c., and the average of the whole is only 12.07 c.c., while the average of 162 pure butters, reported by eight or ten different experimenters in the papers to which we have had access, including those given later in this paper, is 13.89 c.c.

Munier states that he used butters "known to be, without doubt, pure." They were obtained, at least in great part, from three creameries at Amsterdam, Holland, which he thought gave a good opportunity for getting average samples, because the milk came from a large number of dairies. Other observers have failed to obtain, even from Dutch breeds of cows purposely selected, and in any season of the year, the least proof of the correctness of the conclusions deduced by Munier from his work with the butters furnished him by the "Israelitische Molkerei," and other Amsterdam creameries. Munier also tested his butters according to Hehner's method, obtaining, in two instances, 90.17 and 90.1 per cent. of insoluble fatty acids, and in eight more cases, 89.5 per cent. or more.

Notwithstanding the fact that Munier's results have been impugned

by many writers, we have not seen any defense of his figures published, nor any reply to the criticisms.

The analyses published in the present paper were made expressly to test the truth of Munier's conclusions, and, at the same time, to serve as a further guide toward the determination of the standard for butter by Reichert's method.

The proposed plan was to prepare butter in each month from the milk of a single cow, since by so doing any cases differing from the average standard would more surely be encountered. In establishing a standard for a substance like butter, which so often comes into the market as the product from a single cow, this course seems especially necessary.

The tests during the summer months were not regularly made, since Munier's low figures refer especially to the fall and winter months. One of us (Cornwall) obtained the following results: The tests were made strictly according to Reichert's method as above described, and in every case 0.3 c.c. has been deducted from the actual figures obtained in the test, because it was found that this much decinormal alkali was consumed in a blank test of the potash, alcohol and sulphuric acid used. This butter was made in the laboratory, by shaking in a bottle the cream from one quart of milk.

The cows, belonging in Princeton, N. J., were of mixed breeds, fed with the usual fodder given to cows by owners of small herds or single cows, and represented a great variety as to age and time after calving. No connection between the above points and the results of the tests could be traced.

Month.	Decinormal Alkali, c.c.	Month.	Decinormal Alkali, c.c.
January	13.4	October	13.
January	12 5	October	12.4
January	13.7	October	12.8
January	14.5	November	12.2
February	12.9	November	14.2
February	14.2	November	12.6
February	12.6	November	14.4
February	13.2	December	15 2
March	13.3	December	11.5
March	14.5	December	12.2
September	12.2	December	12 9
October	12.3		

The average of these butters is 13.17 c.c. of decinormal alkali consumed.

The very last butter made, being the second one set down for December, falls below the lowest limit assigned by Reichert, or even the limit of 12 c.c., found by Sendtner (*loc. cit.*) It is also the only instance, excepting the figures of Munier, which we have met with in our own experience, or the published result of others, in which less than 12 c.c. of decinormal alkali was required. No butter from this cow had been previously tested, although it is our intention to to make further tests of her butter. Of the figures there can be no doubt. The butter was made in one of our laboratories from sweet milk; the test was made in duplicate, and the standard of the decinormal potash carefully verified by one of us (Cornwall) and also compared with that used by Mr. Wallace.

The melting point of the butter was 35.6° C., tested in a capillary tube. It is to be noticed that this butter, when tested by Hehner's method, gave a high percentage of insoluble fatty acids—89.6 per cent. The Hehner test was made on 3.57 grammes of the butter (not in duplicate) and the insoluble acids were washed with boiling water until they ceased to give any perceptible acid reaction with sensitive litmus solution; a little more than 1,000 c.c. of wash water was used, although the acid reaction had apparently ceased when 900 c.c. had been consumed. The acids were dried in an air bath at 100° C. This high figure by Hehner's test would have stamped the butter as adulterated, according to the generally accepted English standard for insoluble acids; a standard which we believe is not to be maintained (see N. J. Report, 1884, above quoted), at least for butter from a single cow.

Although the above unique instance of butter requiring only 11.5 c.c. of decinormal alkali was met with in December, yet it cannot be taken as any confirmation of Munier's conclusions, because the highest figure, 15.2 c.c., was also found in that month (from a cow in the same herd) while the average for November and December is actually higher than for September and October.

It is, however, certain that the standard for butter from single cows must be reduced below that originally proposed by Reichert, 12.5 c.c., and we would be unwilling to condemn a butter unhesitatingly which required anything over 11 c.c. of decinormal alkali.

The following results with pure butters have been obtained by Dr. William K. Newton, also a member of the Committee of Public Analysts of New Jersey:

Month.	Decinormal Alkali, c.c.	Month.	Decinormal Alkali, c.c.
August	13 7	October	13.7
August	14 2	November	13.7
August	13.1	November	13.9
September	13 9	November	12.9
September	14.2	December	13.3
October	12.9	December	13.8
October	14.1	December	13 9
		Average	13.66

They also show no noticeable diminution in November and December.

The following results were obtained by Wallace. The butter from the "one cow" was obtained in the same manner as described previously; the "commercial" butter was that supplied to the family, together with a number bought at stores and brought in for examination. All of the results obtained go to prove the reliability of the method, and also that the figures do not vary according to the time of the year. We also give the results obtained with samples of known imitation butter, and would call especial attention to one which, by the use of Reichert's method, there was no difficulty in pronouncing "imitation;" but if Hehner's method had been used it would have been passed as "genuine," since although the figures are slightly higher than he says, yet there can be no doubt that "genuine" butter yields sometimes 88.2 per cent. of insoluble fatty acids; in fact, one instance has already been given in this paper, as occurring in our own experience:

"One Cow" Butter.		"Commercial" Butter.	
Month.	Decinormal Alkali, c.c.	Month.	Decinormal Alkali, c.c.
February	13.8	March	15.0
February	13.7	March	14 7
March	14.0	April	15.2
March	14.5	April	15.0
April	14.8	April	14.8
April	15.5	May	15.3
April	16.0	May	15.0
May	14.7	June	15.0
May	15.0	June	14.5
June	15.0	July	14.8
June	15.2	August	15.0
*July	13.0	August	15.5
August	14.0	September	14.5

* New cow.

"One Cow" Butter.

Month.	Decinormal Alkali, c.c.
September	14.8
October	14.0
November	13.8
November	13.0
November	13.2
November	14.2
December	13.5
December	14.0
Average	14.27

"Commercial" Butter.

Month.	Decinormal Alkali, c.c.
September	14.0
September	14.7
September	13.8
October	13.5
November	14.3
November	13.8
November	13.5
December	13.7
December	14.0
Average	14.52

IMITATION BUTTER.

0.8 c.c. Decinormal Alkali	Oleomargarine or Butterine.
0.6 " " "	" " "
0.5 " " "	" " "
4.1 " " "	Sueine.
3.7 " " "	"
3.9 " " "	"
4.2 " " "	"

This last one, which required 4.2 c.c., is the sample referred to, which, on treatment by Hehner's method, yielded 88.2 per cent. of insoluble fatty acids. This, in the writer's opinion, would, in all probability, prove to be the case with the other samples of "sueine," since this article is composed of butter and lard. This one known case, however, is a very strong argument in favor of Reichert's method, since no chemist could have declared the sample "imitation" if he had relied on Hehner's method. Another strong argument in favor of Reichert's method is the uniform results obtained with duplicates, and the closeness of results obtained by two persons working with the same butter, but using different solutions.

The method is simple, does not require any apparatus that is not generally to be found in a chemist's laboratory, and occupies but a few hours. In a case in which one of us was engaged it was very important, dollars and cents being involved, to determine within *three* hours whether a sample submitted was or was not butter. This was done within the time, but it could not have been if Hehner's method had been used. The method is also founded, undoubtedly, on the true difference between genuine and imitation butter, which is the amount of volatile fatty acids in the two, rather than the insoluble

fatty acids. The question submitted to the food analyst is rather whether an article is what it is represented to be than what its composition is, and if he can satisfy himself by a qualitative analysis that is sufficient, quite as much so as it would be in case an ore was submitted and he was asked if it contained a certain element. This method of Reichert's is a "qualitative" analysis in the fullest sense of the term, and is also "quantitative" in a partial sense. It is perfectly possible, and is done in manufacture, to produce an imitation butter, which, by the use of Hehner's method, would be passed for the genuine article, but if Reichert's method was used, no analyst would hesitate a moment in pronouncing judgment as to its true character.

To us it appears that Reichert's test, with a proper standard, is the most rational of the common quantitative methods for testing butter, as it certainly is the most convenient. Only those who have used both Reichert's and Hehner's methods can appreciate the convenience of the former.

Moreover, as has been shown by one of us before, (Report of the State Board of Health of New Jersey, 1884,) Hehner's method is far less capable of detecting a possible adulteration of butter with cocoanut oil than Reichert's, while one of us (Wallace) has met with an artificial butter in actual commercial analysis, which would have passed Hehner's test, but fell far below Reichert's limits.

It has been asserted by an eminent authority (*Analyst*, London, June, 1885,) that a process should not, on principle, be tolerated, "by which only a fraction of the substance to be estimated was obtained." To this it may be replied that Reichert's process is just as thoroughly a quantitative process as any other process for butter analysis, as regards the conclusions to be deduced from it. A chemist can mix a pure butter and a foreign fat (lard, for instance,) in certain proportions, and can announce beforehand that it will require, within certain reasonable limits, a given quantity of decinormal alkali by Reichert's method. Can any one do more by any method of butter analysis? Before a court of law the chemist can affirm that a certain fat is not pure butter, because pure butter always consumes at least so much decinormal alkali (say 11 c.c.) when tested by Reichert's method. Can anything more certain and definite be reasonably insisted upon?

In these days, when the analysis of foods is so much to be desired, is not every method that yields the required result in a shorter time

to be preferred? It is not necessary to urge that Reichert's process is more accurate than any other. Grant that it is only as accurate: it cannot be denied that it is more convenient.

We believe that it should be preferred to all other methods, both on account of its accuracy and its convenience, while recognizing the fact that since butter is of variable composition, no method can be absolutely correct.

The result of the investigation of this method by the Committee of Public Analysts of the State, has been that eighty analyses of pure butter have been made, embracing butter received and produced in three sections, with the following average result:

Samples.			
14.	Newton	Northern Section	13.52 c c.
23.	Cornwall	Middle "	13.17 c.c.
43.	Wallace	Southern "	14.39 c.c.
	Or a general average of		13.68 c.c.

with the following as the maximum and minimum:

	Maximum.	Minimum.
Newton	14.2 c.c.	12.9 c.c.
Cornwall	15.2	11.5
Wallace	16.	13. c c.

The average result is very near that originally reported by Reichert, and although the minimum proposed by him should, in view of the results given in this paper, be probably reduced from 12.5 to at least 11.5, yet we believe that his formula for determining the probable percentage of true butter fat in case of a butter falling below the minimum, is still a thoroughly reliable one.

His formula is $B = 7.3 (n - 0.3)$; n being the number of cubic centimeters of decinormal alkali used in titration.

In closing, we would recommend that especial care be taken, when reporting the results of Reichert's test, to state whether the butter is from a single cow's milk, and would also point out the desirability of making tests of such butter in experiments directed toward ascertaining the minimum standard by any method, since it is certain that butters vary greatly in composition, notwithstanding the different opinions which have been advanced on this point. (See especially Reichardt's article, *loc. cit.*)

Postscript.—As already stated, one of us (Cornwall) has met with a single case where the quantity of decinormal alkali solution consumed in Reichert's test fell below any limit as yet reliably estab-

lished. Since that sample of butter was prepared another sample has been made from milk of the same cow (December 28th, 1885), in the laboratory. This butter has been tested by each of us in his own laboratory, using entirely separate sets of re-agents, and we have each obtained identically the same results, viz.: A consumption of 11.3 c.c. decinormal alkali by Reichert's process, after deducting the amount of alkali consumed in blank tests on our re-agents alone. Using the best "potash by alcohol" obtainable and a highly rectified alcohol, one of us (C.) finds that 0.3 c.c. of decinormal alkali is required in the blank test. Since there can be no doubt that the butter from this cow falls below the usually received minimum of Reichert, we believe that, for butters made from the milk of single cows, the minimum cannot safely be above 11 c.c. of decinormal alkali. Whenever it may be possible to prove that the butter is mixed butter from the milk of several cows, we should accept the usual minimum of 12 c.c.

The cow which yielded this butter is one of a herd of eight cows in Princeton, N. J. She is of mixed breed, chiefly Alderney; is nearly five years old; had a calf eight months ago and is expected to have another next May; yields from six to seven quarts of milk daily, at present; her food is barley meal and corn-stalks (maize); she is apparently in sound condition. The butter made separately from five other cows in the same herd, within the same week or nearly so, ranged from 12.2 to 15.1 c.c. decinormal alkali, so that neither the season of the year nor the food appears to have had any influence on the result. It is simply an illustration of the variability in the proportions of volatile fatty acids obtainable from different pure butters.

Since this variability exists, it becomes desirable to confine, for the most part, to butters known to be the product of single cows, any tests made with a view to establishing actual minimum and maximum standards for the fatty acids (whether soluble or insoluble) obtainable from butters.

In case of butter made on the large scale, from the mixed milk of several cows, the lower standard above proposed (11 c.c.) is practically equal to the usual one of 12 c.c., because such butter cannot be profitably adulterated without falling much below either standard when tested by Reichert's process.

REPORT OF THE MILK INSPECTOR.

BY WILLIAM K. NEWTON, M.D.

Ezra M. Hunt, M.D., Secretary State Board of Health:

SIR—I herewith hand you my sixth annual report.

During the past year the work of inspection has been carried out on the plan outlined in previous reports and nearly all sections of the State have been brought under the operations of the law.

The milk sold in the following cities and towns has been inspected: Hoboken, Jersey City, Elizabeth, Plainfield, Paterson, Burlington, Bordentown, Camden, Mount Holly, Bridgeton, Gloucester, Perth Amboy, South Amboy, Lambertville, Atlantic City, Asbury Park, Ocean Grove, Passaic, New Brunswick and Trenton.

The milk-producing sections of the State have also been visited, and the milk shipped therefrom has been thoroughly and frequently inspected.

The results of these inspections have been as follows: In Hoboken and Jersey City many cases of adulteration have been discovered; in Elizabeth, six cans of milk brought into that city by railroad were condemned, while the milk sold from wagons and produced in the adjacent country, was found to be of uniform excellence; at Plainfield, all the milk inspected was found to be good; at Paterson, out of 234 samples examined, but four were found below the standard; at Burlington, Bordentown and Camden no milk was found below the State limit; at Mount Holly, two cases of adulteration have been brought to trial; at Bridgeton and Gloucester, one sample in each place was found to be adulterated; at Asbury Park, one sample was also below the standard; at South Amboy, while the milk was uniformly of poor quality, none was found so low as to warrant prosecution; at Perth Amboy, one sample was taken for analysis; at Lambertville, one case was prosecuted; at Asbury Park and

Passaic, one sample in each place was found to be of poor quality; at New Brunswick, two men were fined for selling adulterated milk.

In the city of Newark, the local inspection has been under the charge of Mr. Henry Negles, the Milk Inspector of the Local Board of Health, who, by his care and efficiency, has done much towards insuring the excellence of the supply. At Trenton, Mr. James H. McGuire, the Health Inspector, has so watched the supply that the quality has been maintained at a high standard.

The inspections through the dairy sections also show a constant and improved quality of milk, and cases of violation of the law have been very rare; one being found in Sussex county, two in Hunterdon county, two in Burlington county, one in Gloucester county and one in Passaic county.

It will be seen by looking over this brief history of the year's work that there has been a decided improvement in the quality of the milk sold throughout the State or shipped from the dairy sections. Formerly many cans of milk were condemned in each city, whereas now it is rare that any infraction of the law occurs.

Assistants have been assigned to work as follows:

Mr. Peter L. Vandegrift has had charge of the inspection in the southern and western parts of the State, and by strict attention to duty has checked adulteration to a great extent.

Mr. Henry B. Everhart has inspected in Hudson county, and the few cases of debased milk found in Hoboken and Jersey City are evidences of his watchfulness.

Mr. James H. McGuire has done considerable special work under my direction.

The amendment to the Milk law that authorizes a trial by jury, has not worked satisfactorily in all parts of the State. In the rural and less densely populated sections it is almost impossible to obtain a jury of unprejudiced men to try a case, and in many instances a neighborly feeling often outweighs all evidence, for the defendant frequently is well known to the jury, hence to prove him guilty of the charge, even in the face of the strongest testimony, is very difficult. In cities, on the other hand, the jury trials have been well conducted, and the cases fairly tried.

The evidence required by law is so surrounded by checks and safeguards that a clear case does not require a jury to weigh it, and the Inspector has no authority or right to begin a case until the testimony is conclusive.

As an instance of the miscarriage of justice through a prejudiced jury, I may mention the facts concerning a case tried in Sussex county. The complaint made before the justice of the peace charged a producer with shipping a number of cans of impure milk, and the proof that the milk was below the State standard was amply supported by the results of the chemist's analysis; this evidence was still further fortified by the written confession of the defendant. After a prolonged trial, and a still more protracted debate in the jury-room, no verdict could be arrived at. The case was retried, and, notwithstanding the conclusive evidence, the jury acquitted. An appeal was now taken to the Quarter Sessions, and after a trial lasting near an entire day, and after much deliberation by the jurors, they could not arrive at a verdict. The result of the new trial, soon to occur, can only be conjectured.

The change in public opinion concerning the purposes and methods of enforcing the provisions of the milk law is remarkable. In portions of the State, where the opposition was heretofore the strongest, the benign and salutary effects of the statute have been so apparent that the most hearty indorsement is now given to the work of the Inspector. Only those people who have felt the rigor of the law in the role of defendant, those who do not yet understand the objects of sanitary measures and those who are never satisfied with any law, remain to be classed amongst the opponents of this now very popular enactment.

MILK ANALYSES.

In the following tables I have given the results of analyses made during the year. The first table will show the results of analyses of pure milk, the second gives the results obtained from milk of doubtful purity, while the third outlines all cases that fell below the legal standard:

TABLE I.

ANALYSES OF MILK KNOWN TO BE PURE.

No.	County.	Total Solids.	Fat.	Solids-not-fat.	Specific Gravity.
1	Gloucester.............	14 23	4.48	9.75	1.0319
2	Burlington.............	14.63	4.51	10.12	1.0330
3	Atlantic................	12.80	3.00	9.80	1.0319
4	Cumberland............	19.50	10.11	9.39	1.0292
5	"	14.85	4.88	9.97	1.0324
6	Burlington...........	12.84	3.06	9.78	1 0324
7	Middlesex..............	15.76	6.36	9.40	1.0292
8	Passaic..................	13.12	3.70	9.42	1.0304
9	"	13.57	4.69	8.88	1.0307
10	"	13.77	4.87	8 90	1.0316
11	"	14.13	4.23	9.90	1.0320
12	Burlington.............	15.21	6 00	9.21	1.0292
13	Cumberland............	15.59	5.54	10.05	1.0330
14	Burlington	18.43	8.88	9.55	1 0313

Nos. 4, 5 and 13 were taken from the cans of a vendor in Bridgeton. Each sample represents the mixed milk of more than one cow, and was as it is sold to customers.

No. 8 was from a cow in Passaic county, claimed by the owner to be "the poorest milker in the county;" this claim being made by the producer when notified to stop selling impure milk. The character of the milk on sale at the time may be seen by reference to No. 9, Table III.; the difference between the two samples is notable.

No. 12 is a fair sample, taken from the can of a vendor at Mt. Holly.

No. 14 gives the results recently obtained by an analysis made by Mr. Shippen Wallace. The figures are remarkable and lead one to suppose that the milk was from an Alderney cow, but the following history will give the true facts in the case: "The cow was of common stock, six years old, had her fourth calf last August, and is fed on bran and meal besides ordinary pasture." The remainder of the samples given in this table were from vendors' wagons or from ordinary cows.

TABLE II.

SAMPLES ABOVE THE STANDARD, OF DOUBTFUL PURITY, BUT MANY OF THEM KNOWN TO HAVE BEEN EITHER WATERED OR PARTIALLY SKIMMED.

No.	Total Solids.	Fat.	Solids-not fat.
1	12.60	3.94	8.66
2	12.64	3.96	8.68
3	12.16	3.70	8.46
4	12.08	3.96	8.12
5	12.51	4.11	8.40
6	12.66	4.28	8.38
7	12.90	4.48	8.42
8	12.10	3.83	8.27
9	12 85	3.73	9.11
10	12 23	2.67	9.56
11	12.84	3.06	9.78
12	12.30	3.36	8.94
13	12.53	3 31	9.22
14	12.67	3.67	9 00
15	12.21	4.60	7.61
16	12.21	3 66	8.55
17	12.51	4.32	8.19
18	12.22	4 00	8.22

The specific gravity of all these samples was below 1.029, a figure below which pure milk never registers. The solids-not-fat in nearly all instances is too low. In a few cases proof was offered that the milk had been watered or partially skimmed, but as the standard set up by law is so low, no complaint would hold in court.

TABLE III.

ANALYSES OF CONDEMNED MILK.

No.	Total Solids.	Fat.	Solids-not-fat.	Disposition of Case.
1	11.73	2.43	9.30	From the State Camp at Sea Girt. See note below.
2	11.20	2.40	8.80	
3	11.12	2.16	8.96	
4	11.42	2.44	8.98	
5	9.84	2.43	7.41	Plea of guilty. Fined $50.
6	10.51	1.30	9.21	Skimmed, shipment stopped.
7	11.49	3.18	8.31	Partly watered.
8	10.70	2.70	8.00	Defendant not found.
9	11.91	3.30	8.61	See No. 8, Table I.
10	9.70	2.42	7.28	Plea of guilty. Fined $50.
11	10.52	2.97	7.55	" " "
12	10.72	3.17	7.55	" " "
13	10.50	2.35	8.15	Destroyed.
14	11.84	2.94	8.90	"
15	11.72	3.64	8.08	"
16	9.48	2.84	7.00	Plea of guilty. Fined $50.
17	9.87	2.87	7.00	" " "
18	10.54	3.18	7.36	" " "
19	10.81	2.95	7.86	" " "
20	11.64	2.92	8.72	" " "
21	8.26	2.01	6.25	" " "
22	9.20	2.70	6.49	Plea of guilty and paid $61 for the two cases.
23	10.35	3.38	6.96	
24	9.26	2.06	7.20	Plea of guilty. Fined $50.
25	10.34	2.89	7.45	Two samples from same man. Fined $50.
26	10.54	2.75	7.79	
27	10.44	2.96	7.48	Plea of guilty. Fined $50.
28	11.16	2.98	8.18	" " "
29	11.92	3.56	8.36	Case pending.
30	11.30	3.22	8.03	" "
31	10.90	2.66	8.24	Fined $25.
32	10.13	2.55	7.58	Plea of guilty. Fined $50.
33	11.32	3.33	7.99	No complaint made.
34	10.07	2.45	7.62	Plea of guilty. Fined $50.
35	11.52	3.59	7.93	No case made out.
36	11.79	2.76	9.03	" " "
37	11.02	3.26	7.76	" " "
38	10.58	3.30	7.28	Plea of guilty. Fined $50.
39	11.85	3.14	8.71	Case not tried.
40	10.11	2.77	7.34	Plea of guilty. Fined $50.
41	10.74	4.31	6.43	" " "
42	11.09	3.46	7.63	" " "
43	10.12	......	......	Case pending.

SUMMARY OF CASES IN TABLE III.

Cases tried and penalty inflicted in each case	24
Cases now pending	3
No case, or complaint not made out	6
Milk destroyed, no prosecution	5
Defendant not found	1
Sea Girt cases, in charge of Quartermaster-General	4
Total	43

Of the twenty-four cases paying penalties, twenty paid a penalty of $50 each; one paid a penalty of $61 for two cases; and one, through error, was only fined $25. Four cases were made out on the same day against the same man, but the penalty was only inflicted for one offense. The total amount of penalties collected by justices of the peace, and which should now be in the hands of the State Treasurer, was $1,086. When a penalty is inflicted, I immediately notify the Comptroller of the Treasury, and then my responsibility ceases, for the law does not permit me to have any charge over the money collected. The money thus paid to the State will go very far towards paying the running expenses of this department.

As was stated above, in six cases no action was taken. This may be explained by the fact that in many instances it is impossible to comply with all the requirements of the law. The law insists that the sample of milk must be taken and sealed in the presence of a witness and then sent to one of the members of the Council of Public Analysts. As a witness to the sealing cannot always be obtained willing to testify, many cases are lost to the State, and no case can be made out without this witness. In a few instances, the absence of the analyst from town has made it impossible to have the work of analysis done in time. In four cases the milk was destroyed and no further prosecution undertaken, because the owner lived at a great distance, or out of the State

The four samples, Nos. 1, 2, 3 and 4, taken on different days at Sea Girt, represent the quality of milk furnished to the State Camp by the contractor. The inspection was made at the request of Quartermaster-General Perrine. None of the milk was pure, or up to the State standard, it being skimmed and a mixture of whole and skimmed milk. The results of my inspection were reported to General Perrine, it being understood that the contractor would not be paid, because of his breach of contract, hence no prosecution was

begun by me. At the time of writing, I have had no advice from the Quartermaster's Department as to whether any action has been taken to punish the contractor.

EXTENT OF ADULTERATION SHOWN BY THE TABLE.

The amount of adulteration, by adding water to the milk, as shown by Table III., varies from thirty-three per cent., in a few cases, to from twenty to as low as five per cent. The abstraction of cream is noted in many instances.

DISPOSITION OF VIOLATIONS OF THE LAW.

Only six or seven cases have been subjected to a prolonged trial before a justice of the peace and a jury. The greater majority of persons charged with a violation of the law have entered a plea of guilty, and paid into court the penalty prescribed. Although the penalty may be paid without a protest, yet many men are inclined to ease the pangs of conscience by ascribing the blame to the "hired man," or it is said that an unusual quantity of "rinsings" have found their way into the milk-can, both of these phrases being the euphonious manner of admitting the adulteration.

THE STATE STANDARD.

The State standard of 12 per cent. of solids has been repeatedly tested during the past year, and I have not yet found a sample of pure milk that fell below that figure. Many requests have been made for analyses of milk from cows reported to be poor milkers, but in no case did a sample contain less than the required amount of solids. Tests made in New York and Massachusetts indorse, in every point, the wisdom of setting up a limit, but it is acknowledged that the 12 per cent. standard does not represent milk of extra quality; in fact it is said by some that a premium for the production of inferior milk is thereby offered. If any change is to be made in this standard, it should be in the direction of increasing the severity of the test, so that no milk shall be sold that contains less than 3 per cent. of fat and 9 per cent. of solids-not-fat.

In New York State it was recently determined, after many analyses, that a minimum of 12.5 per cent. of solids would be the proper limit,

and that all milk below that figure should be rejected. The milk of 296 cows was analyzed by the chemist to the New York Dairy Commissioner. In each case the milk was drawn from the cow in the presence of an inspector, so that the authenticity of each sample was insured. The results of these tests show that the minimum of milk solids was 12.53 per cent., of fat 3.29 per cent., and of solids-not-fat, 9.17 per cent.

Rules for estimating the amount of pure milk in a given sample are printed in all works on the chemistry of milk. As they are convenient and more or less accurate, they are added here.

When the amount of total solids is known, we may compare the sample in question with the State standard in the following way. Take for instance sample No. 21, Table III., which had 8.26 per cent. of milk solids, then we have this formula:

Pure Milk.			Solids in Sample.		Pure Milk in Sample.
12	:	100 ::	8.26	:	x

Carrying out the proportion, we find that x equals 68.88, or the amount of pure milk in that particular sample, which, of course, means that 31 per cent. of water had been added.

When the amount of solids-not-fat in a given sample is known, we may use that as a factor by which to calculate the quantity of pure milk in that specimen. Multiply the amount per cent. of solids-not-fat found in the sample, by 100, and divide by 9,—the minimum of solids-not-fat in pure milk. Take, for example, the same sample, No. 21, Table III., the solids-not-fat in which was 6.25 per cent; the sum will be: $6.25 \times 100 = 62{,}500 \div 9 = 69.44$ per cent. of pure milk in the sample.

METHODS OF ANALYSIS.

In my report for the year 1883 the methods of milk analysis in vogue were outlined at considerable length, but as possible improvements have been suggested recently the subject may be reviewed with profit.

The experience of the majority of the analysts of this State and New York leads them to prefer the method devised by Prof. Waller, and known as his or Cairns' method, which is a modification of Wauklyn's or the English method. Recently the American Society of Public Analysts, an association composed of public analysts,

chemists and inspectors of food, made an extended inquiry as to what was to be considered the model method of milk analysis. The results of this investigation show that nearly all chemists who had much to do with the analysis of milk were strongly in favor of Waller's or Wauklyn's method; the points in its favor being that it was accurate, rapid and convenient, and, in the hands of competent men, all that could be desired for official work.

Dr. A. R. Leeds is the only analyst employing Ritthausen's method, but in his hands it seems to be capable of yielding satisfactory results.

All the methods mentioned above may be found described at page 259 of the seventh annual report of the New Jersey State Board of Health, and space forbids a more extended reference here.

Quite recently, Mr. M. A. Adams, an English chemist, described a process of analysis that has attracted considerable attention and has been investigated by many chemists with varying results. (*The Analyst,* Vol. X. No. 108.) The process is described by the author as follows: Strips of stout white blotting paper are cut two and one-half inches wide, and twenty-two inches long; each of these strips is rolled into a helical coil on a glass rod the size of a lead pencil. These coils are thoroughly dried. The milk to be examined is mixed and 5 c.c. are discharged into a small beaker. This beaker is weighed with the milk and then a coil of the paper is gently thrust into the milk, and in a few minutes the paper sucks up nearly the whole of the milk. The paper is then carefully withdrawn by the dry extremity, gently reversed and stood, dry end downwards, on a clean sheet of glass. The beaker is again weighed and the milk taken got by difference. The charged paper is next placed in the water oven on the glass plate and dried. It is next placed in a Soxhlet extractor and the fat extracted. The paper is removed from the extractor and dried in the air bath and the fat determined in the usual way. Experiments with this method show that the fat determinations are higher than with the Waller or Wauklyn methods. The many steps of the process make it more difficult to manage than either of the above-named methods, and great care is necessary to obtain concordant results. This method is now being tried and the results will probably be reported next year. Full details may be found at page 47 of the journal quoted above.

The method of analysis devised by Dr. S. M. Babcock, chemist to the New York Agricultural Experimental Station, and described on page 167 of the second report of that station, was brought to the

attention of the American Society of Public Analysts and excited much discussion. It seems to be worthy of extended trial by chemists.

In Babcock's method the milk is put into a platinum dish containing freshly ignited asbestos and dried at 100° C. to constant weight. As he says: "The asbestos serves as an absorbent of the milk and presents a large surface, which greatly facilitates the drying." When the amount of fat is desired, the milk is placed in a test-tube with a perforated bottom and filled three-quarters full of ignited asbestos, and a plug of cotton inserted to prevent the escape of loose fibers of the asbestos. The tube and contents are weighed, the plug of cotton removed and five grammes of milk run in and the cotton replaced. The tube, connected at its lower end by a rubber tube and adapter with a filter pump, is placed in a drying oven at 100° C., and a slow current of dry air drawn through till the water is completely expelled. This tube, when cool, is weighed and the total solids calculated. The tube containing the solids is placed in a fat extractor and exhausted with ether. The fat is dried at 100° C. and weighed.

All the methods described call for extended trial at the hands of chemists, and it would well repay the State to have a series of experiments properly conducted to determine which shall be the official method. All the work so far done in this direction has been voluntary on the part of the analysts, and without remuneration; it is certainly time that some official recognition was given for this painstaking work.

Some two years ago the British Society of Public Analysts appointed a committee, composed of seventeen of the most prominent chemists in England, to go over the whole subject of milk analysis and to report the results of their investigations. After the two years of deliberation and experiment the committee has just reported to the society and recommends the following process of analysis (*The Analyst*, No. 117, page 215):

(1) *Total Solids.*—"These to be estimated by evaporating in a platinum dish about 5 grammes of milk. The residue to be dried to practical constancy, at the temperature of a water-oven or water bath."

(2) *The Process of Fat Extraction.*—"Measure 5 c.c. of milk into a beaker 2 inches deep by 1½ inches in diameter; weigh, and place into it one of Adams' coils, which must have been previously

extracted with ether in a Soxhlet and the ether driven off. When as much as possible of the milk has been absorbed by the paper, the coil is removed and placed dry end downwards upon a slip of glass, and the beaker is at once reweighed. Dry the coil in a water-oven for one to two hours, and extract the fat in a Soxhlet apparatus, twelve siphonings at least being necessary, the flask in which the solution is collected being as small and light as possible. Boil off the ether and place the flask in a water-oven in a horizontal position and dry to constancy; allow to cool for about ten minutes and weigh."

(3) "*The Solids-not-fat* in all cases to be determined by difference."

"It is recommended that the specific gravity be taken in all cases."

This report of the committee was not adopted, but will come up for discussion during December.

Leaving, now, the considerations of analytical methods, it may be profitable to note some other facts concerning the inspection of milk.

THE LACTOMETER.

The many thousands of tests of pure milk that I have made during the past six years verify the statements often made in my official reports, to the effect that the mixed milk of healthy cows never has a specific gravity below 1.029 at 60° F., and I have not yet seen a cow that yielded milk that would register a lower figure. This result has been so often verified that it may now be accepted as being absolutely accurate.

Martin, in a recent exhaustive monograph on this subject,* has, with great care, collected and tabulated the results obtained in this country and Europe by twenty-one competent observers. He says "That the average lactometric standing of all the milk as given in the tables, the result of testing some 20,000 specimens, is 1.319. If, then, the average specific gravity of milk is placed at 1.029, it certainly is at its lowest possible limits."

It was found by Martin, after testing the individual milk of over seven hundred cows, that no specimen registered a lower specific than 1.029, at 60° F.

I am strongly inclined to the belief that the specific gravity, and the amount of fat in milk, when taken together, enable us to judge of the purity of milk more accurately than the total solids, for a rich

*Report on milk and its adulterations, by Edward W. Martin, Ph.D., Albany, 1885.

sample of milk may be watered down to the State standard of twelve per cent. of solids, and thus be passed as a pure milk, while the lactometer may easily detect the fraud in such a case.

The specific gravity of milk is simply its weight compared with water, and alone gives no indication of its quality, being dependent upon two constituents, namely: the solids-not-fat and the fat. The former raises the gravity above that of water while the latter lowers it. This explains the reason of skimmed milk indicating higher on the lactometer than whole milk, and this fact is used by those ignorant of what this instrument really indicates to base the claim that it is valueless. It is so, in the hands of one incompetent, but when used by one who understands what causes the fluctuations, and who has more or less practical knowledge of the physical appearances of milk, it is seldom that he cannot tell pure milk from that which has been either skimmed or watered.

The fact that the relation of the fat to the solids-not-fat influences the specific gravity, has led several chemists to attempt the production of a formula by means of which, if two of the factors are known, the third may be obtained by calculation.

Mr. Otto Hehner, in *The Analyst* for August, 1882, gives a formula by means of which the solids-not-fat, and hence the fat, may be determined, if one knows the specific gravity and the total solids in a sample of milk. His formula is follows:

(Total solids $\times .725) +$ specific gravity $\div 4.33 =$ solids-not-fat.

Mr. Shippen Wallace, one of the Public Analysts of this State, has investigated this formula and has tested it in the analyses of some two hundred samples. He reports that "This formula is, with milk containing from two to three and a half per cent. of fat, to be depended upon as a check and verification of solids-not-fat, as obtained by extraction of the fat, and if there should occur a greater difference than one meets with in duplicate analyses, the analyst should then look for a reason and determine the amount of ash, when the probable cause, such as the addition of some solid substance to the milk, will no doubt be found."

THE LACTOSCOPE.

As was said above, the amount of fat in a sample of milk greatly influences its specific gravity, hence an instrument for the rapid determination of the fat is of great value to the inspector. Mar-

chand's lacto-butyrometer, which was described in previous reports, is of value in the laboratory, but what is needed is an instrument that can be used in ordinary inspection and without the use of chemical agents. Many such instruments have been devised, amongst which may be mentioned the lactoscopes of Donné, Vogel, Hoppe-Seyler, Seidlitz, Tronimmer, Heinrich, Feser, Leeds and others. These instruments all aim to enable an observer to ascertain the amount of fat by optical methods, by measuring the degree of capacity or turbidity caused by mixing a certain quantity of milk with a known quantity of water, or *vice versa*. Two modifications of these methods are employed: either a uniform dilution of the milk with water is used, which still permits one to recognize through the tube a certain object; or else the experiment is begun with a stated and uniform quantity of milk, which is diluted with water until a black line or figure may be seen through the mixture. The former method is not very accurate, while the latter admits of a considerable degree of accuracy. Of all the instruments devised for this purpose Feser's lactoscope is the most satisfactory and the one most in use. For the past two years I have used it considerably and have found it to be a rough-and-ready means for estimating the amount of fat in milk, and when very carefully used its readings approximate quite closely the results obtained from an analysis. The difficulty of obtaining concordant results is against its use, for the light used, the eyesight of the observer and other factors interfere with a correct reading of the instrument. The milk inspectors of Brooklyn and Boston have used it for two or more years and claim good results by its use.

The instrument is a hollow glass cylinder, graduated with two scales, one giving the number of cubic centimeters it contains, the other the per cent. of fat. In the lower part of the tube a piece of milk-white glass is inserted upon which are black lines. When testing a sample of milk 4 c.c. are transferred to the lactoscope and water added until, after thorough shaking, the black lines are just visible. The difficult point to decide is when to commence the reading.

The instrument under discussion has been thoroughly tested by the German Board of Health, and a recent report gives the results of the investigation as follows:*

*Arbeiten aus dem Kaiserlichen Gesundheitsamte. Erster Band. Erstes und Zweites Heft. Berlin, 1885, page 36.

"The results of different observers, in reference to Feser's instrument, deviate not only from the chemical test, but also amongst themselves, so considerably that, in spite of Feser's warm recommendation, this instrument does not appear to be practicable for the *exact* test of the amount of fat."

"The optical instruments in their application encounter a number of difficulties. First—the kind of light existing at the time of examination influences the test very markedly. Second—the power of the observer's eyesight is of great importance. The degree of turbidity, which is considered the measurement of fat, depends not only on the quantity of fat in the milk, but also on the casein which it contains. Besides this, the butter is contained in the milk in globules of different diameters, and it is plain that a certain amount of fat in the form of smaller globules obstructs the light more than the same quantity of fat in larger globules. If the cream is removed the larger globules are also withdrawn, and then the smaller ones preponderate, then the amount of fat is easily found too high in the lactoscopic examination."

From this we may claim that the lactoscope is of little value from a scientific point of view, but as a rough means for inspection it may be depended on to a great extent.

NIGHT AND MORNING MILK.

The popular idea that the night's milking is richer than the morning's, is, as a general rule, true, and recent experiments made at the New York Experiment Station show conclusively that this fact has some foundation. Over one hundred and fifty separate analyses of the night and morning milk were made, and the work continued for nearly three months. The figures show that almost invariably the night's milk contained more fat than the morning's. This report is of value, as it settles a disputed point. But it does not affect the methods now in use to test commercial milk as shipped on railroads through this State, for, as a rule, no attempts are made to keep separate the two milkings.

THE DETECTION OF IMPURE WATER ADDED TO MILK.

The addition of water to milk is a practice much to be deprecated, but adulteration by means of foul or polluted water, or that contam-

inated with sewage, is a very dangerous crime, for it is well known that milk so poisoned may carry such diseases as cholera and typhoid fever into the human organism.

We have seen that chemistry can not distinguish between pure water and the water normally existing in milk, and that the most satisfactory way to determine the amount of added water is to compare the sample in question with a standard. The question now comes up, Can chemistry determine whether or not polluted water has been used to dilute milk? This is an important problem, for if contaminated water can be detected, we have another link in the chain of evidence. Fortunately we are able to answer this question in the affirmative, at least to a partial extent. To determine the existence of organic pollution, we naturally look to the methods employed for the detection of pollution in drinking-water.

Waller and Martin have found (*op. cit.*, p. 74,) that nitrites may be detected in milk adulterated with contaminated water in the same manner that nitrites are determined by methods employed in water analysis. They say: "In order to detect impure water in milk we can apply a modification of the ordinary sanitary analysis of water, as follows: 300 c.c. of milk are to be coagulated with acetic acid and filtered; to 100 c.c. of the filtrate are added about 10 c.c. of a mixture of a solution of equal parts of sulphanilic acid and sulphate of napthylamine. Now, should the milk contain nitrites, or in other words water contaminated with sewage, a rose-red color will commence to form, deepening in intensity on standing, and the deeper the color the more the nitrites present. I have tried this test on milk which I knew to be pure, with negative results, and have detected the presence of nitrites in milk to which one part in a million had been added."

Any of the tests usually employed to detect nitrites may also be be used, such as Griess' method.

As a corroborative test, the one described by Uffelman (*The Analyst*, No. 113, p. 146,) may be employed. This has for its object the detection of nitrates and is used as follows: A small quantity of diphenylamine is put in a white capsule; over this is poured about 25 minims of sulphuric acid, free from nitric acid; the mixture is stirred with a clean glass rod until it is of a pale rose color. Now let three or four drops of the suspected milk trickle down the side of the capsule. If nitrates or nitric acid be present a blue color appears.

In closing, I may offer as an excuse for the length of this report that it was thought important to collect together the scattered facts relating to the subject under discussion. The literature of milk analysis is rapidly multiplying and the work in this direction is great, the analysts of this State having contributed no inconsiderable portion to our stock of knowledge bearing on sanitary chemistry.

CIRCULARS AND LAWS.

MODEL HEALTH ORDINANCES FOR TOWNSHIPS.

The public health laws of this State empower local Boards of Health to pass ordinances for certain purposes, and to impose penalties for the violation of such ordinances. These ordinances, to be legal, must be enacted in a certain manner, must be properly drawn, and may embrace the objects outlined in the laws, but must not include any subject not allowed by these laws.

To be lawful, ordinances passed by local Boards must in no way depart from the form or matter required by the statutes.

As the purposes of, and the methods for, enforcing these local laws are not clearly understood, we shall recapitulate all points relating to the matter under discussion.

Local Boards of Health of any city, town, township, borough, or any commission government, may pass, alter or amend ordinances for the purposes named: I.–IX., Chapter CLV., Laws of 1882. See Circular LIV., page 10; and all but townships may also pass ordinances on subjects named, Chapter CLIX., Laws of 1884, page 13 of Circular LIV.

Local Boards of Health may pass ordinances embracing the subjects as thus mentioned, and on any other subjects that would fairly come under Sections 7 and 8 of Chapter CLV., Laws of 1880, page 7 of Circular LIV.; and ordinances for purposes not thus mentioned are illegal, and cannot be enforced.

It must be remembered that Health Boards have no powers except those conferred by law, and they cannot assume any powers not given them.

Ordinances, codes, resolutions and rules, except as permitted by statute, have no binding force and cannot be enforced.

Ordinances can only be passed at a stated or adjourned meeting at which a *quorum* is present.

All ordinances must be published once a week, for three weeks, in

some paper printed and circulating in the city, town, borough or township, but in case no paper is published the ordinance must be posted in five different public places in the city, town, township or borough, and published in some paper of the county once a week for three weeks. (See Circular LIV., page 11.) Ordinances go into effect thirty days after the day of the first publication.

Ordinances may be amended, altered or repealed at either an adjourned or stated meeting; this action must be published the same as the original ordinance.

Penalties not exceeding one hundred dollars, and not less than ten dollars, may be enforced for violation of ordinances.

The action at law being one for a debt, the penalty to be enforced must be stated in the section of the ordinance, and no less or greater sum than is stated can be recovered.

It is well to state in each section what the penalty for violation is, and, as a different penalty may be required for different offenses, it should be fixed at a high enough figure to deter violations.

One great mistake made by local Boards, is in passing too many ordinances and then not enforcing them; it is far better to have a short, comprehensive code and to see that it is rigidly enforced.

No provision is made in the various laws for the collection of fees for permits, licenses or registration, and it is questionable whether the imposition of such fees is legal, except where the Legislature has authorized it.

We have endeavored to make the following model codes as comprehensive as possible, but it is not probable that they will apply equally to all cities and towns, for each place has its local customs or practices that need special attention, but the ordinances are so drawn as to be capable of modification to suit each particular case.

Two forms are given, one for cities, towns, boroughs, etc., the other for townships. (The first form is not printed this year because of lack of space.)

In enforcing ordinances, two methods are available, either to proceed against the person for violation of the ordinance, or else to notify the person first, giving a stated time in which to abate the nuisance or to remedy the defect, and then to proceed under the law if the notice is not obeyed.

As far as possible, the following sections of the model code follow the order in which the subjects are given in the State laws, and are grouped together in that order.

CODE FOR TOWNSHIPS.

NOTE.—To avoid repetition the final clause in each section is omitted, but in passing an ordinance, whenever a penalty is provided for, it must be inserted. It is a maxim of law, that the two most important things are the penalty of disobedience and the mode of process. The clause should read as follows: "And any person offending against or violating any of the provisions of this section shall forfeit and pay a penalty of dollars." (See Chapter CLV., Sec. 5, Laws of 1882; Circular LIV., page 11.)

Be it ordained by the Board of Health of the township of ———.

ADULTERATED AND UNHEALTHY FOODS.

SEC. 1. That no person shall manufacture, have, offer for sale or sell any article of food or drugs which is adulterated within the meaning of "An act to prevent the adulteration of food or drugs," approved March 25th, 1881, and the supplement thereto approved March 23d, 1883. And any person offending against any of the provisions of this section shall forfeit and pay a penalty of fifty dollars, to be recovered in an action under the provisions of the aforesaid law and the supplement thereto.

SEC. 2. No meat, fish, bird, fowl, vegetable, fruit or milk, not being healthy, fresh, sound, wholesome and safe for human food, nor the meat of any fish, bird, fowl or animal that had died from disease or accident shall be brought into this township or offered for sale or sold. And any person offending against or violating any of the provisions of this section shall forfeit and pay a penalty of dollars.

SEC. 3. No decayed or unwholesome fruit or vegetables shall be brought into this township, sold or offered for sale. And any person, etc.

SEC. 4. That no calf, pig or lamb, or the meat thereof, shall be brought into this township, held, or offered for sale, or sold, at the date of its death, being a calf, was less than four weeks old, or being a pig, was, when killed, less than five weeks old, or being a lamb, was, when killed, less than eight weeks old. Nor shall any meagre, sickly or unwholesome fish, bird or fowl be brought into the township, held, sold, or offered for sale. And any person, etc.

SEC. 5. When any meat, fish, bird, fowl, fruit or vegetable is found by any inspector or member of this Board offered or exposed for sale, and which is in a condition unwholesome or unfit for food, he shall

order the same to be removed, and it shall be the duty of the owner or person in charge of such matter or substances to immediately remove the same from any market, street or place, and such articles shall not be sold or offered for sale, nor in any way disposed of for human food. And in case the owner or person in charge shall fail or neglect or refuse to remove said articles within three hours after having been notified to do so, the same may be removed by the inspector or any member of this Board, the owner or person in charge paying all expenses therefor. And any person, etc.

DEFINITION OF NUISANCES.

SEC. 6. That nuisances within the township are hereby defined and declared, and shall include and embrace, the throwing, placing or depositing in or on any place, public street, alley, sidewalk, gutter, open lot or public grounds, within the township, any dead animal, fish, bird, or any part of the same, or any carrion, putrid meat, manure or compost; also any foul or offensive or obnoxious matter or substance whatever, whether composed wholly, partly or jointly or entirely of animal or vegetable matter; also any thing, matter or substance, of any nature, kind or composition, in or upon any private land, lot, building, tenement, cellar, pit, well or other structure, whether said matter or substance is mixed or unmixed, compounded or otherwise, composed wholly, jointly or partly of liquid or solid matter or substance, which shall cause or produce, or from which there shall arise or be cast off, any impure or obnoxious or offensive or foul odor, smell or gas, annoying or hurtful or dangerous to any person; also any full or leaky cesspool, or any full or leaky privy vault; allowing or permitting any liquid or solid matter taken from any cesspool or privy vault to be placed or deposited in or upon any lot, place, street, road, alley, gutter or lane in the township; allowing or permitting any of said substances to leak or ooze out of the cart, wagon or vessel or other thing in which the same may be placed, while upon or passing along any of said roads, streets, alleys or lanes; also conveying said substances along any of said roads, streets, alleys or lanes of the township, except in air-tight tanks or vessels; also the burning of any thing, matter or substance, within the township (other than coal, wood, charcoal, gas or oils), which shall emit into the air, or cause or produce or cast off any foul or obnoxious or offensive or

hurtful or annoying or repulsive gas, smoke or odor of any kind whatever. Any and every nuisance as above defined is hereby prohibited and forbidden within the township, and any person making, causing, maintaining or permitting any of said nuisances shall forfeit and pay a penalty of dollars.

SEC. 7. Whatever is dangerous to human life or to health, whatever building, erection or part or cellar thereof is not provided with adequate means of ingress and egress, or is not sufficiently supported, ventilated, drained, cleaned or lighted, and whatever renders the air, food or water unwholesome, are declared to be nuisances and are prohibited. And any person who shall aid in erecting or contributing to the same, or who shall continue to retain or maintain any of them, shall forfeit and pay the penalty of dollars.

CONTAGIOUS DISEASES.

SEC. 8. Every physician shall report to the township physician of this Board in writing, the name, age, and address of every person having scarlet fever, diphtheria, small-pox or varioloid, cholera, typhoid fever, typhus fever or yellow fever or any other contagious or infectious disease publicly declared by this board to be dangerous to the public health, whom such physician shall have professionally attended or prescribed for, said report to be made within twenty-four hours after such physician has first professionally attended such sick person. And any person, etc.

SEC. 9. Every physician shall report in writing the name, age and address of any person who shall have died of any of the diseases mentioned in the foregoing section, within three hours after he shall have been informed of said death, and such report shall be independent of the regular certificate of death required by law. And any person, etc.

SEC. 10. No person shall, without a permit from this Board, carry or remove from one building to another any person sick with any contagious disease; nor shall any person, by any exposure of any individual sick of any contagious disease, or of the body of any such person, or by any negligent act connected therewith or in respect to the care or custody thereof, or by needless or careless exposure of himself, cause or contribute to or promote the spread of disease from any such person or from any dead body. And any person, etc.

SEC. 11. No principal, teacher or superintendent of any school, and no parent or guardian of any child attending any school, shall permit any child sick with any contagious disease, or any child residing in any house in which such disease shall exist, to attend any school until this Board shall have given its permit therefor. And any person, etc.

SEC. 12. In case any infectious or contagious disease shall occur, the persons affected thereby shall, at the discretion of this Board, be isolated, quarantined or removed to such locality as the Board may order and direct; and all buildings, clothing, property and premises which may become infected by the presence of persons affected by contagious or infectious disease shall be disinfected, and said disinfection or fumigation shall be done in such manner and with such materials as this Board may direct. And this Board may establish such separation and isolation or domestic quarantine of the sick from persons not necessary as attendants, and also provide and effect such special care, disinfection and cleaning of property and premises as shall be needed in order to prevent the spread of such diseases.

SEC. 13. No public funeral of any person dead of any contagious disease shall be held in this township and no person shall be allowed to enter the premises or view the body except those attendant on the dead, but immediately after death the corpse shall be placed in an air-tight coffin or otherwise prepared for burial with such precautions as this Board may direct, and shall be buried as speedily as possible. And any person, etc.

SEC. 14. The terms "contagious disease," or "infectious disease," or "dangerous disease" shall be taken to mean scarlet fever, diphtheria, small-pox or varioloid, typhus fever, cholera and yellow fever, and such other diseases as shall be publicly declared by this Board to be dangerous to the public health.

SLAUGHTERING AND THE KEEPING OF CATTLE.

SEC. 15. The slaughtering or killing of cattle, swine or sheep shall not be allowed within the limits of this township without a permit granted for that purpose by this Board. And no slaughter-house or place where cattle, sheep or swine are slaughtered or killed shall be allowed within the township unless a permit for that purpose shall be granted by this Board. And any person, etc.

SEC. 16. No cattle, swine or sheep shall be killed for human food

while in a diseased, overheated, feverish or exhausted condition; nor shall cattle, swine or sheep for human food, be killed within twenty-four hours after driving or transportation, nor until rested and properly fed and watered, nor shall any meat from any diseased animal be sold or offered for sale in the city. And any person, etc.

SEC. 17. No person shall allow any cattle or swine to run at large in the township, nor shall any person keep any swine without a permit so to do granted by this Board. And any person, etc.

TO PROHIBIT THE ACCUMULATION OF OFFAL, ETC., AND TO PROHIBIT AND REMOVE NUISANCE.

SEC. 18. No person shall throw, place or deposit, or allow to collect on or flow over any sidewalk, street, road, alley or place, any slops, dirty water, or filth of any kind. And no person shall throw, place or deposit on any street, road, alley or place, any dead animal, fish, or any part of the same, or any putrid meat, compost, or any foul or offensive substance whatever. And any person, etc.

SEC. 19. No person shall throw, cast, place or deposit, or allow to flow or run into any stream, river or brook, in the city, any dead animal, putrid meat, garbage, offal, manure, compost, or any foul or offensive substance whatever. And any person, etc.

SEC. 20. It shall be the duty of any owner, tenant, lessee, or occupant of any lot, ground, building, house or stable, in the townships, on notice from this Board, to forthwith remove from said lot, ground, building, house or stable, any rubbish, garbage, offal, or any offensive matter or thing; and it shall be the duty of any person, on notice from this Board, to abate any nuisance existing on any premises of which he may be the lessee, owner, tenant or occupant. If any person shall refuse or neglect to remove any foul or obnoxious, or hurtful matter or thing, or if any person shall refuse or neglect to abate any nuisance, then this Board may proceed under the provisions of "An act concerning the protection of the public health, and the record of vital facts and statistics," approved March eleventh, one thousand eight hundred and eighty, and the supplements thereto; and shall remove said nuisance, source of foulness, or cause of sickness, and shall recover, by action of debt, the expense incurred by said Board by such removal.

VITAL STATISTICS.

Sec. 21. Every person having authority to solemnize marriage shall transmit to the township assessor a certificate of every marriage solemnized before him, within thirty days next thereafter, and said certificate shall be made out on the blank forms furnished by this Board for that purpose, and shall include all facts required by said forms. And any person violating the provisions of this section shall forfeit and pay the penalty provided by section 24 of this ordinance.

Sec. 22. It shall be the duty of the physician or midwife present at the birth of every child born in this township, but in case there is no physician or midwife present it shall be the duty of the parent, to report in writing to the township assessor all particulars called for on the blank forms furnished by this Board for that purpose, and said report shall be made within thirty days next after the date of said birth. And any person, etc.

Sec. 23. That in the case of any person dying within this township it shall be the duty of the physician who may have attended during the last illness, to furnish the undertaker, or any member of the family, a certificate of death, which certificate shall be made out on and shall comprise all the facts stated in the blank forms furnished for that purpose. And any person, etc.

Sec. 24. Any person violating any of the provisions of sections 21, 22 and 23 of this ordinance shall be liable, in an action at law, to a penalty of fifty dollars, said action being in the form of an action of debt.

PRIVY VAULTS AND CESSPOOLS.

Sec. 25. No person shall build, make, erect or maintain any privy vault or cesspool unless the same shall be made or constructed of brick and cement, and said vaults or cesspools shall be not more than four feet deep and the sides and bottom thereof shall be at least eight inches in thickness and made of well-burned brick, well laid in hydraulic cement (*provided, however*, that in lieu of bricks the bottom may be constructed of one piece of flagstone laid in cement), and said vaults and cesspools shall be water-tight.

Sec. 26. No owner, tenant, agent, lessee or occupant of any premises shall allow the contents of any privy vault or cesspool to flow therefrom, or to rise within one foot of the top thereof; nor shall any

privy vault or cesspool be allowed to become offensive to sight or smell; nor shall any privy vault or cesspool be filled with sand or earth until the contents shall have first been removed; nor shall any person throw, cast, place or deposit in any privy vault or cesspool any dead animal, swill, ashes, garbage, rubbish, offal or any substance not appropriate to the purpose for which structure was intended. And any person, etc.

PUBLIC WATER-SUPPLY.

SEC. 27. No person shall throw, cast, place or deposit, or allow to flow into any river, stream, brook, reservoir, cistern or well, the water of which is used for drinking purposes, any dead animal, or any part of the same, or any carrion, putrid meat, manure, compost, slops, or any foul or offensive substance whatever, or any substance or thing that will in any way pollute or render hurtful or unhealthy the water of said river, stream, brook, reservoir, cistern or well. And any person, etc.

SEC. 28. Whenever this Board shall have satisfactory evidence that any well or cistern, the water of which is used for domestic purposes, has become polluted and rendered unsafe for use, notice to discontinue the use of said polluted water shall be sent to the owner, agent or person in charge of said well or cistern, and said owner, agent or person shall, on receipt of such notice, close said well or cistern and fill it up with fresh earth or discontinue the use of the water thereof And any person, etc.

BURIALS AND DISINTERMENTS.

SEC. 29. No person shall bury or disinter the body of any person without a certificate from this Board, and all human bodies when buried shall have at least four feet of earth on top of the coffin in which is said body. And any person, etc.

OFFENSIVE TRADES.

SEC. 30. No person or persons shall carry on any trade, manufacture or business within the township which may be obnoxious or offensive to the inhabitants of said township, or any part thereof, and which may be attended by noisome and offensive odors, without having

first obtained a permit from this Board; such permit to be granted only on such terms and conditions as shall be from time to time prescribed by said Board, to which terms and conditions the applicant or applicants for such permit shall subscribe before receiving said permit, and such permit shall not be transferable in case of sale or transfer of the business, in which case a new application must be made in the name of the parties who propose to conduct the business; and the said trade, manufacture or business may be at any time summarily abated in case of failure or neglect to comply with the terms and conditions of the permit; and any such trade, manufacture or business which may be established within the township without having first obtained the permit hereinbefore provided for, shall be summarily abated, as provided in the act of March 11th, 1880, and such acts as may be amendatory thereof and supplementary thereto; and any person offending against any of the provisions of this section shall forfeit and pay a penalty of twenty dollars for each day in which such trade, manufacture or business may be carried on.

If complaint shall be made to this Board of any nuisance or nuisances, or if the Board shall come to know of any other nuisances, foulness, or cause of disease or risk to the public health, not specified in the ordinances herewith published, the nuisance or risk to the public health thus occurring shall be dealt with as provided for in the other ordinances herewith published. And any person offending against or violating in any such case, in a way regarded by this Board as a nuisance and a risk to the public health, shall, according to the provisions of this section, forfeit and pay a penalty of   dollars.

Some townships may see fit to omit the ordinances relating to adulterated and unhealthy foods, and those as to the slaughtering and keeping of cattle. Each code or series of ordinances should, at its close, have the section named in the note at the beginning.

The chief laws relating to public health passed by the Legislature of 1885 are referred to in Circular LIV. of this Board, a copy of which can be had on application by postal.

The most important principles involved in the authority and administration of our health laws this year came before the Court of Errors and Appeals on appeal from decree made on the advice of Vice Chancellor Bird. The opinion, as delivered by Justice Magie, is here given in full.

"MAHLON HUTCHINSON et al., appellants,

v.

"THE STATE, EX REL. THE BOARD OF HEALTH OF THE CITY OF TRENTON, respondent.

"1. No power exists in the common council of Trenton, under its charter, to license an individual to lay a private sewer in public streets or to discharge filth into an open watercourse not a public sewer. One who thus uses a private sewer laid under permission of an ordinance of the council, cannot claim to be exempted from proceedings to abate or restrain a public nuisance created thereby, on the ground that such use is an act authorized to be done by public authority.

"2. A board of health organized under the "Act concerning the protection of the public health, and the record of vital facts and statistics relating thereto," approved March 11th, 1880, (*P. L. of 1880, p. 206,*) may file a bill in the court of chancery as relators, in the name of the State, for an injunction to restrain the continuance of any nuisance hazardous to the public health of the locality. In this respect the remedy to restrain such a nuisance, which formerly was required to be in the name and at the instance of the attorney-general, has been extended so that a proceeding in equity for an injunction may be taken by such a board.

"On appeal from decree made on the advice of Vice-Chancellor Bird, whose opinion is reported in *Trenton Board of Health* v. *Hutchinson, 12 Stew. Eq. 218.*

"*Mr. W. M. Lanning* and *Mr. B. Gummere*, for appellants.

"*Mr. James Buchanan* and *Mr. G. D. W. Vroom*, for respondent.

"The opinion of the court was delivered by

"MAGIE, J.—The bill in this case was filed in the name of the State, on the relation of the Board of Health of the city of Trenton. It charged the appellants (one of whom was the owner and the other the occupant of a hotel in Trenton) with causing and maintaining a public nuisance injurious to the health of the inhabitants of that city, by discharging into Petty's run, through a pipe or sewer laid in West Hanover street, filth and offensive matter from the sinks and water-closets of the hotel. It sought an injunction against the continuance of the nuisance.

"Appellants, by their answer, denied that the discharge from the hotel caused the nuisance complained of, and insisted that they had acquired a right to lay and maintain the sewer, which right was such as to bar any proceeding against them for a public nuisance. They further denied the right of relators to file this bill in the name of the State, and asked that they might have the same benefit of the objection thus raised as if they had demurred to the bill.

"The cause came to hearing before Vice-Chancellor Bird, and on his advice a decree was made perpetually enjoining appellants from discharging into Petty's run, through the pipe, the filth and offensive matters from the hotel.

"The proofs taken below afford, in my judgment, ample justifica-

tion for the conclusion there reached that the discharge complained of was a public nuisance, hazardous to the public health.

"Nor can I find any ground to dissent from the conclusion of the learned Vice-Chancellor, which denied to appellants the protection they claimed against proceedings to abate or enjoin the nuisance.

"Their contention was (and it has also been urged in this court) that they had acquired a right to maintain this sewer and to empty the waste of the hotel into Petty's run, by the act of the public authorities of the city of Trenton, and that while exercising the right so acquired they were shielded from indictment, injunction or other proceeding founded on the ground that the permitted act caused a public nuisance.

The pipe was laid by Edmund Bartlett, then owner of the hotel. Just before it was laid, the common council of Trenton had passed an ordinance giving Bartlett power to lay a ten-inch drain-pipe or sewer from the hotel through West Hanover street to Petty's run. The ordinance provided that the pipe or sewer was to be constructed so as to prevent its becoming a nuisance, and that if it should become a nuisance or injurious or dangerous to the public, on which the opinion of the common council was to be final or conclusive, then it was to be removed by Bartlett, and, if he failed to remove it, by the council at his expense.

"The ordinance was accepted by Bartlett, as required by its terms, and he laid the pipe and used it, as appellants have since done, under such authority as was acquired by and under this ordinance.

"At the time this ordinance passed, the common council had power to cause sewers to be constructed in any part of the city, when, in their judgment, the public good required, and to assess the cost of such sewers on property benefited. *P. L. of 1874* § *25 pl. VIII.*, § *76 pl. II.*

"The ordinance did not expressly permit the pipe when laid to be used to carry off offensive matters. When it is understood that the point of discharge at Petty's run is in a thickly-settled part of the city, and that the run (which is a natural water-course) traverses a thickly-settled region before it empties into the Delaware, and when it is noted with what care the ordinance requires it to be constructed and used so as not to become a nuisance, some ground is afforded for the argument urged on our attention, that it was never intended to authorize its use to discharge what might reasonably be expected to create a nuisance. But I think the language used in the ordinance requires us to consider it a grant of whatever power the council could thus grant, to use the pipe in the mode sewers are ordinarily used.

"In the case of *Hunt* v. *Lambertville, 16 Vr. 279*, power granted to a municipal corporation to lay public sewers at public expense, was held to include by implication a power to permit such sewers to be built at private expense. But the case differed from the case in hand. The sewer in that case, though built at private expense, was to become

a public sewer. It was to be used not only by those who built it but by others. In this case the sewer was to be used only by the party building it, and was plainly to remain his private property.

"Under the authority to lay sewers for the public good and at the public expense, I am unable to discover authority, by grant or license, to permit the use of public streets for a private sewer.

"It is not the case of a connection with a public sewer. Petty's run was not such a sewer, but an open, or partially open, water-course. Connections with public sewers are necessary incidents to their use, and the power to permit them to be laid is implied from the power to lay the sewers.

"Nor has my examination of the Trenton charter enabled me to find any grant of power broad enough to justify a grant or license to an individual to occupy public streets with private sewers. Beside the authority to lay public sewers, there is nothing giving more extensive rights in the streets than the charter considered by Chancellor Zabriskie in *Glasby* v. *Morris, 3 C. E. Gr. 72*, and held not to justify a license to maintain a private sewer in a public street.

"My conclusion is that there was no authority in council to pass this ordinance permitting this private sewer to be laid and its contents discharged into Petty's run.

"It is urged that the court ought not to examine the authority of council to pass such an ordinance, but appellants invoke the ordinance as a protection, and it is necessary to determine its legality and sufficiency.

"The conclusion thus arrived at disposes of this contention on the part of appellants, for it is only when the act which has caused a nuisance has been done by virtue of authority derived from the supreme legislative power, that the public, which has granted the authority, is estopped from pursuing the actor by remedial or primitive proceedings for the resulting public injury.

"Although I put my conclusion on the ground above stated, I do not wish to be understood as implying that if council had authority to permit appellants to discharge the filth of this hotel through the public streets, the result would necessarily be favorable to them.

"When exemption from proceedings as for a public nuisance is claimed, on the ground that the nuisance was the result of an act authorized by public authority, it must appear that the public injury was the necessary or probable result of the permitted act, when performed with the utmost care to prevent injurious results. *Wood on Nuisances Chap. 23; King* v. *M. & E. R. R. Co., 3 C. E. Gr. 397; State* v. *M. & E. R. R. Co., 1 Dutch. 437.*

"Nor would I be considered as implying that if council had, under the authority actually vested in them, built a public sewer discharging in a thickly-settled part of the city and there creating a nuisance, indictments would not lie or injunctions would not issue to punish those who maintained the nuisance or to restrain its continuance.

When that case arises, it will be necessary to decide whether authority to construct public sewers includes authority to create a nuisance.

"The next objection made by appellants questions relator's right to file this bill in the name of the State.

"When the ground on which a nuisance is attacked is the injury to the public, the ordinary and proper remedy is doubtless by bill or information on the part of the Attorney-General. *Wood on Nuisances § 811; Attorney-General* v. *D. & B. B. R. R. Co., 12 C. E. Gr. 1.*

"Relators properly admit that their right to institute this proceeding must be derived from statute. They claim to have such right under an act entitled, 'Supplement to an act entitled, 'An act relating to local boards of health,' approved March 22d, 1881,' which supplement was approved March 22d, 1883. *P. L. of 1883 p. 119.* By the tenth section of this act, power is given to certain local Boards of Health to file a bill in equity as relators in the name of the State, for an injunction to prohibit the continuance of nuisances hazardous to public health. Relators insist that they are within the provisions of this section.

"This insistment requires us to determine the *status* of relators, and incidentally to examine various acts on the subject of the protection of the public health.

"By the charter of Trenton, heretofore referred to, the common council was empowered to establish a Board of Health, to define its powers and duties, and to provide for the protection and maintenance of the health of the city. *P. L. of 1874 p. 344* § *25 pl. XXII.*

"Under this power a Board of Health was organized and established, and such a Board was in existence in 1880.

"By the 'Act concerning the protection of the public health and the record of vital facts and statistics relating thereto,' approved March 11th, 1880, (*P. L. of 1880 p. 206*,) it was enacted that every city, borough, incorporated town, or a town governed by a commission, should have a Board of Health, to be organized in the manner set out in the act. By a proviso contained in the eleventh section, the act was, however, excluded from operating on Boards of Health then organized in any city under its charter. The act was, therefore, not operative in the city of Trenton.

"The obvious intent of this legislation was to provide for a Health Board in every municipality; where such Boards were already organized, they were left to act under their respective charters. But where no such Boards existed, the act required them to be created.

"The next act to be considered was entitled 'An act relating to local Boards of Health,' and was approved March 22d, 1881. *P. L. of 1881 p. 160.*

"The second section of this act is expressed in language which is most unfortunately obscure and ungrammatical, but it may, in my judgment, be construed as enacting that any Board of Health organized in any city under the provisions of its charter, may, by the

order and direction of the mayor and common council of such city, be organized in accordance with the provisions of the act of 1880.*

"The plain intent of the section is to give authority to those cities in which the act of 1880 was not operative, to organize their Boards of Health in the manner prescribed by that act.

"But it it insisted that, in this respect, the legislature has failed to effectuate its design, and that the act, or at least the section in question, is unconstitutional.

"It is said that the title of the act does not express the object aimed at in this section. But it is sufficient if the object is, by fair intendment, included within the title. *Walker* v. *Union, 4 Vr. 350; Snipe* v. *Shriner, 15 Vr. 206; Payne* v. *Mahon, 15 Vr. 213.* Legislation respecting local Boards of Health would fairly include legislation respecting the organization of such Boards.

"It is further urged that this section amends the act of 1880, and so becomes obnoxious to the constitutional prohibition against revising or amending any act by reference to its title only. But, while this act incidentally extends the operation of the act of 1880, it is not amendatory legislation within the meaning of this constitutional prohibition. The section in question does not amend the act of 1880 in terms, or by implication. Its effect upon that act is not direct, but incidental, and such legislation is not prohibited. This view of this clause of the constitution has been taken in the supreme court in *Van Riper* v. *Parsons, 11 Vr. 123; Evernham* v. *Hulit, 16 Vr. 53,* and in *Campbell* v. *Board, 16 Vr. 241.* The last case has, at this term, been approved by this court.

"These are the only constitutional objections to the act of 1881 which have been urged upon us. No other objections were made, or have been considered.

"The act, therefore, not being objectionable on those grounds, must be considered as giving opportunity to the city of Trenton to organize its Board of Health in accordance with the act of 1880.

"By an ordinance of the common council, approved by the mayor on July 12th, 1882, it was ordained that a Board of Health should be organized under the act of 1880. The ordinance repealed the ordinance establishing a Board of Health under the charter.

"Under this ordinance relators were organized, and have since acted as the Board of Health of the city.

"Appellants further urged that the organization is not such as the act of 1880 required.

"If the Board has been organized, and is in existence *de facto* under this act, I apprehend that this objection could not be considered. Their title to office could no more be contested in this proceeding than could the title of an attorney-general, acting in his office, upon an information filed by him.

* This act has since been amended.

"But examination shows that the ordinance does provide for an organization in accordance with the act of 1880. It prescribes the number of members, and the mode of appointment, as the act requires. It directs that one city physician and one health inspector shall be members, and the act requires them to be members if there are such officers in the city. It prescribes a term of service, within the act, for all the members, except the physician and inspector. It fixes the term of those members at the term of their respective offices. It is in this respect that the ordinance is attacked, and it is contended that these members are required, by the act of 1880, to hold office for at least three years. But this is not, in my judgment, the true meaning of that act. When its requires existing officials to be members of the Board, it implies, of necessity, that they are to be members during their official term. The prescription of the act respecting the term of members of the Board, is manifestly to be limited to such members as are not such *ex officio*.

"Having reached the conclusion that this Board was properly organized under the act of 1880, it follows that they have power to initiate this proceeding. The ninth section of the act of 1883, above referred to, provides that any Board of Health so organized may inquire into the existence of nuisances hazardous to public health, and the tenth section provides that any *such* Board may file a bill in the Court of Chancery, in the name of the State, for an injunction to prohibit the continuance of such nuisances.

"It was further urged that the court below erred in not receiving pertinent evidence offered to show that the discharge of the waste from this hotel through the sewer complained of, occasioned less hazard to health than any other practicable method of disposing of it, until the city of Trenton built public sewers, into which it could be discharged.

"The argument was that hotels are public necessities, and, as such, licensed to entertain guests; that the waste matter from every human being tended to create a nuisance; that when many were collected, the disposal of such waste was necessarily at the risk of creating a nuisance, and that a court of equity would not enjoin one method of disposal of such waste, if shown that other practicable modes were more injurious.

"But this contention cannot prevail, and the evidence offered was rightly rejected. No business is so necessary as to justify those conducting it in creating a nuisance within the thickly-settled parts of a city. If a hotel cannot dispose of its necessarily accumulating filth without creating a nuisance, and happens to be erected in a populous city which will not or cannot provide sewers or other facilities for disposing of such filth without injury, it is plain that its business must cease in that locality until it can be conducted with due regard to public safety and comfort.

"The decree should be affirmed, with costs.

"*Decree unanimously affirmed.*"

At the next term of the same court the decree of the Court of Chancery in the case of Butterfoss against the Board of Health of Lambertville, was affirmed without written opinion.

Reference may also be made to the Health Officers of Newark, Paterson, Vineland and Asbury Park as to cases which have occurred under their complaint.

Cases before the district courts, such as the case given, page 29 of the Secretary's Report, give additional light as to the law.

CIRCULAR LI.

TO LOCAL BOARDS OF HEALTH OF CITIES AND TOWNSHIP.

TRENTON, April 1st, 1885.

The question is no longer raised in this State as to the need of local Boards of Health in all our cities and townships. So soon as it came to be asserted by physicians, and to be proven by statistics, that a large number of diseases result from local causes, or from errors that can be prevented, so soon the care of health and life became a public and a local duty. The value of a local Board consists in its ability to instruct the people as to the causes of disease; to warn them of the serious results of avoidable evils; to prevent nuisances, or abate those that exist; to be ready to meet any sudden peril from epidemics, and to bring to bear the prompt action of law where other means fail. The Boards of Health as now constituted in most cities under the general law of the State, and the township Boards, made up of the township committee, the assessor and a medical member, are capable of being greatly useful in their respective localities. Where there has been failure to maintain these Boards, as required by law, we have many instances, even in sparse townships, which show the consequences of neglect. In many more instances, where such Boards have been active and efficient, there is the most satisfactory evidence of good results. Circular XXXIX., herewith sent, gives full instructions as to the duties and privileges of such boards.

The anxiety this year as to the invasion of cholera surely must help to incite such Boards to thorough vigilance, although the avoidable

sickness and deaths from other causes should be a constant motive to proper oversight. Each year a copy of our annual Health Report for the use of the Board of Health has been sent to each assessor. Reference to these will show the scope of the work, and the various directions in which your Board can be of service. So long as we have them, we will also send copies to each member of a Board, if requested to do so by postal. Each Board should have all the Reports, and make these the beginning of a small health library.

Experience has shown that in townships and villages there should be, early, each spring, a sanitary inspection of houses and their surroundings, in order that defects may be known and remedied. Frequently those who desire to be careful are not aware of the dangers to water-supply, to cellars, and to house-air from defective drainage, cesspools, or other sources of disease. Cow-yards, hog-pens and slaughter-houses are often in too near proximity to houses, or water is used from wells situated near them. We have prepared a plan for house inspection and sanitary survey, which can be had on application.

Cellar drainage and airing is not enough attended to, or roof-water is allowed to fall around the house so as to dampen the cellar and its walls. Each spring *everything* should be removed from the cellars. Even the boxes and barrels that are to be returned to it need airing and cleaning.

It is important that cesspools and closets and wells connected with railroad stations be carefully examined, as in times of epidemic they are often the starting points of specific contagions. The same is true of hotels and places of public assembly.

Water and milk as well as the meat-supply must be carefully guarded. Other points are referred to in Circular XXXII. of this Board (Sixth Report). In summer many of our cities have found it advisable to issue directions as to the care of children. In times of cholera they fall early victims if their summer disorders are not promptly met by proper diet and medicine.

Local Boards should fully acquaint themselves with all prompt methods for isolation and disinfection of communicable diseases. The circulars of this Board are at their command by postal.

The attention of parents and school trustees should be called to the need of vaccination for all children, so that small-pox may never be caught in any town or township. The return of marriages, births

and deaths must be carefully made. In every intelligent community there are now those who are studying the laws and conditions of health, and who are availing themselves of the reports and circulars of this Board and of other sources of information. If local Boards fail to recognize of how much service they can be, it will not be the fault of the State, or because of the need of more health laws on the statute books. We ask of all Boards that they be thoroughly alive to the duty and privilege of aiding in the securement of health and the prevention of the avoidable causes of disease. We hope to have for the present year some Special Sanitary District Inspectors who will be sent to aid local Boards and Inspectors when desired. *Examine carefully enclosed slips of important laws just passed.*

E. M. HUNT,
Secretary.

P. S.—If in any township the Board of Health, as required by the law, has not met, the assessor will, on receipt of this, please send us postal containing name and P. O. address of the members of the township committee.

CIRCULAR LII.

SANITARY INSPECTION OF HOUSE AND PREMISES.

INSTRUCTIONS FOR FILLING OUT RETURN.

Number the Inspection Returns consecutively in the space No......, at head of each blank.

In entry No. 1 describe the *location* by street and number, or otherwise, *so that it cannot be mistaken.*

No. 2. Give the *full* name of the owner or owners, or tenant.

No. 3. Give the *aggregate* area of all out-houses, sheds, privies, stables, etc., and indicate their positions on the *Plan of the Premises.* (See back of the blank.)

No. 4. If the site of house is *above* level of adjoining land, strike out the words "same as" and "below;" if the *same,* strike out "above" and "below;" if *below,* strike out the other words. Write in the proper word before the entry "drained before building"—*not* or *tile,* as the case may be. State character of *soil*—gravel, sand, clay, loam, etc.; wet, damp or dry. If *made ground,* state character of

filling. Also, state whether the site was *originally* springy, swampy, old water-course, dry ravine, pond, and how roof-water is disposed of.

No. 5. State as to mode of *heating* and *ventilation—painted or papered walls.* If school, assembly rooms or tenement, state as to *fire-escape.*

No. 6. State whether *yard* is paved—drained—clean—amount and kind of garbage, filth, animals, etc.

No. 7. Describe *ventilation* and *lighting* of cellar or basement. State whether occupied for *living purposes—dry* or *damp,* or at times *water in it*—for what used—note *condition* and *kind* of articles stored, and kind and amount of *refuse, filth,* etc. Condition of rooms in house.

No. 8. Note condition of *sinks*—odor—leakage—traps—waste-pipes. Of *drains*—covered—open—foul—clogged—unventilated. Of *cess-pools*—construction—covered—leaky—full—overflowing.

No. 9. As to *vault,* note construction—leaky—offensive—too full. As to *water-closet*—state whether pan, plunger, hopper or washout, or other—traps—ventilation of soil-pipe—ventilation of room.

No. 10. State whether water used for *drinking and cooking* is cistern, well or hydrant—hard or soft—its general character—whether *sickness* has ever been attributed to it—what probable source of pollution, if any exists.

No. 11. If more than one family of occupants, letter each. Example: (*a*) *James Guire,* (*b*) —— (*c*) —— (*d*) ——; and gives names of head or on memorandum.

No. 12. Note *over-crowding*—occupancy of inner, unventilated rooms, cellars, etc.

Nos. 14, 15 and 16. Inquire especially concerning the following diseases: *Bowel disorders, Typhoid Fever, Scarlet Fever, Small-Pox, Diphtheria, Measles, Erysipelas, Consumption, Pneumonia.* In No. 14 state how many cases and what diseases are found at date of inspection—*adults, children* and *sexes* specified. In No. 15 the same for the past twelve months. In No. 16 specify the *causes* of any deaths during the past twelve months—giving ages and sexes.

No. 17. Mention any conditions which are *Nuisances,* either public or private—on the premises or adjoining, in street, gutter, sewer. Make suggestions as to the important sanitary *defects* and their *remedy.* If more space is needed for remarks, use a *memorandum* marked same *number* as Return, with street and house number also. State facts plainly but never exaggerate.

See diagram " Plan of Premises," with explanation.

[Sample Blank Filled Out.]

[SEND FOR ONE.]

SANITARY INSPECTION OF HOUSE AND PREMISES.

INSPECTION RETURN NO. 1.

See Instructions and Filled Blank. **See Diagram.**

State, *N. J.* County, *Essex.* Township, ... City, *Newark.*

1. Ward, *4th.* Street, } *Spring, E. side, 4th s.* No. *26.*

2. Owner: *John Smith. Lessee 4 tenants.*

3. Size of lot; *25* ft. by *100* ft.; area of lot *2,500* sq. ft.; covered by house *1,250* sq. ft.; by out-houses *200* sq. ft.

4. Site of house: Level { same as } adjoining land. *Not* drained before building. *Soil, 2 ft. rubbish and clay. Damp. Part of roof-water runs off by leaders on the ground.*

5. Heating and ventilation: *No* Fire-escape.

6. Yard: *Plank walks to out-buildings. Often wet. Garbage and manure heap near stable and pig-pen.* Animals: *1 horse, 1 cow, 2 pigs, poultry.*

7. Age of house: *20* years; Material: *Wood on brick foundation.* Basement or Cellar: *Both. 2 living rooms.* No. of stories: *3.* Light and ventilation *by 4 windows, front and rear. No drainage. Vegetables in one corner. Air stagnant. Not* cemented *and very damp.*

8. Cesspool—Sink—Drain: } *Kitchen sink not trapped—connects by unventilated pipe with covered cesspool, brick laid so as to leak. Cesspool overflows by open drain to alley. No disconnection by air vent. A drain runs to privy vault.*

9. Privy vault: } *Wooden box—no bottom—very offensive. 40 feet from well. Cleaned 2 years since. Too near the well.*

10. Water-supply: *Well-water. Cistern in cellar for laundry use. Too near privy and cesspool (see Diagram).*

....

11. No. of families: } *2.* Names of heads of families: } *1 Mrs. West; 2 James McGuire.*

12. No. of occupants: } Adults, *3.* White, *9.* Children, *8.* Colored, *2.* No. Native, *7.* Foreign, *4.*

13. **Vaccinal status: Adults vaccinated, *2*; not vaccinated, *1*; Children vaccinated, *6*; not vaccinated, *2*; Had small-pox: Adults, *1*.**

14. Sickness now: *1 Child. Cholera infantum. 2 years old.*

15. Sickness during past twelve months: *2 Children, dysentery. 1 Adult, typhoid fever.* United length of time: *2 months.* (*Much sickness in same house previous years.*)

16. Deaths during past twelve months: *1 Child, dysentery. 1 Adult, typhoid fever.*

17. Nuisances and suggestions. (See Memorandum and Diagram attached as to 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 17.)

....

....

Place and Date: *Atlas, April 4th, 1885.* *Robert Jones*, Inspector.

Sample in Accord with Inspection Return No. 1.

EXPLANATION.

The spaces in the diagram represent areas of five feet square, or a total area of 20,000 square feet—the dimensions of the block being 100 feet by 200 feet.

Taking the bottom line for the front of the lot, indicate by a pencil line the size and shape of the lot—leaving a margin on each side if there be room.

Next, outline the size and location of the house and other buildings.

Then indicate by letters the location of the well (by *W*), cistern (by *C*), privy (by *P*), cesspool (by *Cp*), garbage (by *G*), stable by *St*), pig-pen (by *Pp*).

Also the course of drain or pipe from the house by a dotted line with the letter (*d*) at the waste pipe of dotted middle if it is a **Drain** to cesspool, or by the letter *S* if it be to a Sewer.

Strike out the unnecessary points of the compass. Example: if the house fronts *North*, strike out E. S. W., or if northwest, strike E. and S.

On either side of the outline of the lot indicate location of adjoining buildings, wells, privies, etc., so far as there may be room.

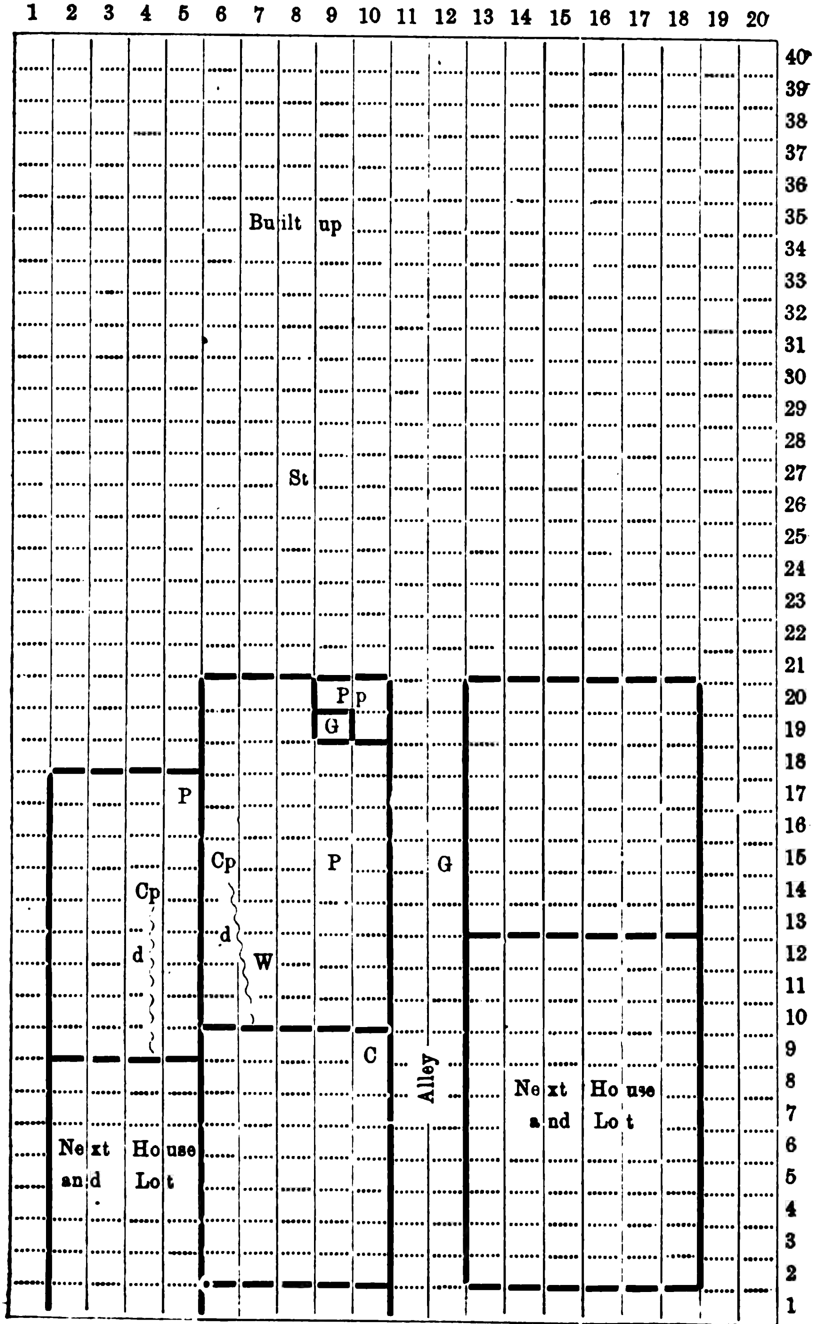
If necessary, the proportions of this Diagram may be increased by estimating the area of each space at ten feet square. If this be done, note the fact.

Part of the Diagram may also be used to show size of rooms, ventilating, heating, etc., if the lettering is explained.

NOTE.—Keep all these sheets as permanent records filed for reference.

OUTLINE ON WHICH TO MARK PLAN OF PREMISES.

South Street.



No. 24. 26

Spring Street.

Front: N. E. S. W.

SAMPLE OF ADDED MEMORANDUM OF INSPECTOR'S RETURN.

Inspection Return No. 1. **26 Spring Street, Newark.**

4. The surface of the lot has the *same level as the surrounding land.* The best that can be done will be to make surface drains to the gutter in the front of the house. Any natural drainage—as by a water-course—with which the lot can be connected, should be utilized by surface drain thereto. This should be kept open and free from any accumulation of filth, garbage, etc.

5. The furnace in cellar is very open jointed and has no fresh air box. There is much dust from it. Two of the papered walls are in bad condition. There are four tenants and no fire-escape—or double stairs.

6. The yard should be thoroughly cleaned; wet places covered with fresh stone lime; the manure and garbage removed; stable and pig-pen cleaned.

7. The brick cellar is used for storage purposes, and two rooms are occupied as a basement. The cellar should thoroughly be cleaned—the decaying vegetables removed, all refuse and dirt gathered up, and the walls and ceiling whitewashed. If there are any moist places they should be covered with fresh-burned lime, and the windows, front and rear, should be kept open as much as possible to secure fresh air and sunshine. Cistern should be changed from cellar.

8. The kitchen sink connects by an *untrapped waste-pipe,* through a *wooden box drain,* with a *covered cesspool.* There will, consequently, be a flow of foul air—greater in winter than in summer—from the cesspool into the kitchen, and thence into other parts of the house. The waste-pipe should have an **S** trap, and the box drain should be replaced by a metal one, and ventilated by an opening between the house and cesspool. This cesspool *leaches* or leaks, and is too full. It should be emptied, and then made tight by cement—or, better still, filled up with clean earth, and a new one made farther away from the well, provided with a ventilating cover.

9. The privy vault should be emptied, disinfected and filled up with clean earth, and a new vault dug farther from the well. If the present one is used after cleansing, the dry earth system should be adopted.

10. The well, located for convenience about ten feet from the kitchen door, has a leaking cesspool within fifteen feet, and a privy

vault about as near. Its water is *suspected.* Sink drain from kitchen to cesspool runs too near well. Another source of supply should be provided as soon as practicable.

11. The Sanitary Inspector should visit this house frequently and secure thorough house-cleaning.

15. The sickness and death record of this house for the last six years has been so bad that it should have in all details expert sanitary inspection. The plumbing is bad. House scarcely tenantable.

17. *Nuisances* caused by the condition of the *gutter in front of house and of the alley in the rear,* call for immediate attention from the local authorities. The gutter along this street should be cleaned out, and a suitable depth and slope be secured so as to afford proper drainage. The livery stable owner should be notified to abate the nuisance caused by him in the alley.

The Inspector, after pointing out what requires to be done by the owner and occupant, should soon make a re-inspection to see whether the defects and evils have been remedied. If found necessary, formal notice should be served, and compliance should be enforced by such measures as the law provides.

In all this work very much will depend upon the tact, discretion and good judgment of the Inspector.

NOTE.—Samples to be had on application by postal to E. M. Hunt, Secretary, Trenton, N. J.

CIRCULAR LIII.

PURE DRINKING-WATER—HOW TO SECURE IT.

The importance of having a pure drinking-water is such that every care should be taken to secure a good water-supply, and then to keep it pure.

Impurities are either animal, vegetable or mineral. Where the organic matters are animal, they tend to become putrescent, and when taken into the system may produce fever or other disorder. When the matter is introduced in smaller quantities, it undergoes decomposition more or less rapidly according to the condition of the air or temperature. In such cases no smell or taste may be perceptible.

The constant use of such water sometimes causes disease, even where the quantity is small. Some persons seem more susceptible than others, and their own systems either cause or accelerate changes which had not been noticeable before. Vegetable impurities also tend to decomposition under favoring conditions. These disorder the system or cause malaria or other special forms of disease. Mineral impurities are owing to the suspension or solution of mineral particles in the water. Some of these, as sulphur or iron, give taste to water, but do not injure it unless present in too large quantities. Others, as lead, may in small quantities seriously affect the human system. Others, as lime, are chiefly injurious by producing too great hardness of water. The taste of water fresh from the well is not by any means a perfect guide as to its purity. If it has much organic matter in it which is already undergoing decomposition, there may be taste and odor, or its organic impurities may have been so far destroyed as to yield no unpleasant taste or odor, and yet there may remain some dangerous contamination. Its being an agreeable drinking-water to those accustomed to its use does not prove its purity.

Water, as it comes from the clouds and is strained through the ground, is so nearly pure that it is generally good, except where wells and springs are in some way fouled by nearness to houses or pits of decayable material. In cities, where the soil is likely to become filled with decomposable matter to a degree that the ground, the air, the sunlight and vegetation cannot rapidly remove it, the water generally becomes impure.

The usual supply of drinking-water naturally divides into public water-supply, cisterns and wells or springs. Where there is public water-supply, the only way is for companies to have, from time to time, proper examinations made, and, if the quality is not what it should be, to know the cause and to apply the remedies, so many of which are now available. The general water-supply, which has been good, may come to be impure. It may have too much sewage put in the river, or the pipes may become fouled, or these or the reservoirs may have growth of minute forms of plant-life, or water long impounded and in great quantities may become deadened by want of oxygen or air in the water. Thus water, from a good source, may become fouled in its distribution. Proper reservoirs and filtering basins and the introduction of compressed air into the impounded water, will do much to correct any temporary deterioration.

Where cistern-water is relied upon, the first care must be exercised to receive it from a clean roof, to see to it that the first water of a rain does not go into it, and that the main supply is derived from long and heavy rains, rather than from occasional showers. If a leader ends in a hogshead or tank proportioned in size to the water capacity of the roof or its single leaders, and is arranged with an overflow tube to the main cistern, or with an automatic float, it will, when nearly full, divert the purer water into the main cistern, and leave the former to be used for non-drinking purposes. Cistern-water, unless collected and kept with care, may be charged with organic matter. The cistern should in size bear proportion to the needs of the family, so that it can be empty enough to be cleaned twice a year. If in the ground, it should be tightly cemented and kept so well covered that small animals and foul gases cannot enter it. The pump fitted in it should be of metal. When it is claimed that air should be admitted to the cistern, it is best to have an upright shaft of a few feet, in the top of which there is a wire gauze to protect from leaves, etc.

Wells and springs must be most carefully protected from any possible defilement. To this end, it must be remembered that it is not safe to place any well within one hundred feet of any cesspool, privy, cow or pig-pen, or other deposit of foul matter. Sometimes, without knowledge of where these have been before, wells are dug in too close proximity. The well should be carefully stoned or bricked, and for at least four feet from the top the bricks should be laid in cement, and come up higher than the surrounding ground. The soil should not be rich just about the well. The cover of the well and its pump should be such as not to admit any foul matter. People are too often careless in rinsing vessels about a well. Even a cistern may be defiled by the soil or spillings about it, and wells often are. The cistern may have crevices, or may have something fall into it, or may have its water become dead by long standing. The well may have its surrounding soil so saturated with decaying material as finally to become unable to oxidize it. Some new crack or underground rill may let into it foul liquid from sources that have never reached it before, and which are especially liable to reach it in dry weather. The same may, more or less, happen to springs. Therefore, it is not enough to say that a water-supply has been good, as it may have suddenly become bad from causes not visible. Where,

because of sickness or for other reasons, there is suspicion as to the purity of the water, resort should be had to some simple tests, or at once to chemical or biological examination.

Here are a few tests which, without all the appliances of a chemist, may much aid in indicating whether further examination is necessary, or whether it is wise to cease using the water until fully examined:

Color.—Fill a clean, long bottle made of colorless glass with the water; look through the water at some black object; the water should appear perfectly colorless and free from suspended matter. A muddy or turbid appearance indicates the presence of soluble organic matter, or of solid matter in suspension.

Odor.—Empty out some of the water, leaving the bottle half full; cork up the bottle, and place it for a few hours in a warm place; shake up the water, remove the cork, and critically smell the air contained in the bottle. If it has any smell, and especially if the odor is in the least repulsive, the water should be rejected for domestic use. By heating the water to boiling, an odor is evolved sometimes that otherwise does not appear.

Taste.—Water fresh from the well is usually tasteless, even though it may contain some putrescible organic matter. Water for domestic use should be perfectly tasteless, and remain so even after it has been warmed, since warming often develops a taste in water which is tasteless when cold. If the water at any time has a repulsive, or even disagreeable taste, it should be rejected.

As some waters of dangerous quality fail to indicate their impurity either by smell or taste, what is known as the Heisch test is of value: Fill a clean pint bottle three-fourths full with the water to be tested; add to it a half-teaspoonful of clean granulated or crushed loaf sugar; stop the bottle with a glass stopper or a clean cork, and let the bottle stand in the light in a moderately warm room. If in twenty-four or forty-eight hours the water becomes cloudy or milky it is unfit for domestic use. While cloudiness in the water after standing certainly indicates unfitness for use, yet a negative result does not *prove* the water to be good; because the test often fails to indicate organic matter really present, if phosphates are absent.

CHLORINE IN WATER.—The following test for chlorine is also available in the hands of some physicians. It is distinctly understood that the results are approximate. A larger proportion than two grains to the gallon in well-waters is a just cause for suspicion of the

character of drinking-water. Therefore, if you find more than that proportion, examine the well and its surroundings, and in case of sickness forbid use until examined more in detail by other tests. It may happen that less than one grain to the gallon is the normal quantity of chlorine in certain localities, so that it would be well for the examiner to acquaint himself with the normal proportion for the various districts under his care. Any chlorine in excess of the normal amount is suspicious.

CHEMICALS REQUIRED.—Nitrate of silver (pure crystallized), chromate of potash (not *bi* chromate; its color YELLOW, not *red*); distilled water, that from condensed steam of factories, or furnished by druggists, or, better, collected from the domestic tea-kettle by simple device into clean glass bottles.

NOTE.—Always test your distilled water by a drop of the nitrate silver solution. It should give no cloud.

APPARATUS.—A glass-stoppered colored bottle, or one covered closely with dark blue paper for your nitrate of silver solution, capacity, one pint; another ordinary 16-ounce glass-stoppered bottle for chromate potash solution; a white porcelain evaporating dish of 8 ounce capacity, or smooth, white china bowl, or deep soup plate will do as well; a drachm measure divided into minims.

To prepare the solutions:

"SILVER SOLUTION.

"Nitrate of silver, (cryst.) grains, 50; distilled water, 13 ounces; in colored or covered glass-stoppered bottle, as above.

"One drachm of this solution is equal to one-tenth (.1) grain of chlorine. *Weight and measure must be accurate.* Remember, in collecting and testing water, all containers must be clean and then rinsed in the water in question.

"CHROMATE SOLUTION.

"Chromate of potash, 4 drachms; distilled water, 16 ounces.

"Label your solutions and provide 4 ounce glass-stoppered bottles, prepared as above, for use, refilling as required from the larger ones.

"To apply the chlorine test: Pour in the clean dish or bowl, 8 ounces of the water. To that add a drachm of the chromate solution and mix, with a clean broken thermometer tube or other clean glass

rod. The water will have the bright yellow color of the chromate. Into the clean drachm measure put exactly 1 drachm of nitrate of silver solution. Pour it, drop by drop, into the colored water, stirring well after each drop. So long as the red color produced by the silver disappears entirely on stirring, continue dropping, but the moment it gives a permanent reddish tinge, however faint it may be, to the water, your test is made. Read the number of minims you have used. The drachm represents the tenth of a grain in 8 ounces, or 1.6 grains per American gallon. Therefore, 30 minims = .8 grains per American gallon; 15 minims = .4 grains per American gallon, and so on. A water which takes more than 1 drachm of the silver solution contains more than 1.6 grains per gallon. You can tell how much more, by taking another drachm of the silver solution and proceeding as before, on the same sample, till the red color is permanent. Suppose it takes 30 minims more, you would then have used 1.5 drachms = .15 grains chlorine in 8 ounces of the water, or 2.4 grains per American gallon. Figure the same way for any other proportion.

"FORMULA.—Multiply .1 by the amount of silver solution in drachms and fractions of a drachm which are required for the test; this gives the number of grains of chlorine in 8 ounces of the water. That, multiplied by 16, expresses the chlorine in grains per American gallon.

"NOTE.—Grains of *chlorine* per American gallon can be reduced to grains of *salt* per American gallon by multiplying by 1.65."

Water thus found impure should not be used until further tested either by the usual chemical methods, or the additional gelatine method proposed by Koch. Even where water is suspected, it is much better not to use it for drinking purposes until it has been boiled and poured several times from one vessel to another to aerate it. Or if boiled and passed through a filter, similar aeration takes place. Alum has considerable power as a purifier of water, as it combines with albumen, etc., and removes or settles the organic matter. As, when taken in much quantity or continuously, it affects the health and causes disturbance of the digestion, its popular use has been generally discouraged. But good authorities claim that even if an amount of two grains to the gallon be well stirred through the water and it be allowed to stand a few minutes, it will do much not only to clear it but to dispose of the organic matter, and that this amount can have no ill effect.

Where it is found desirable to have further chemical testing of the water, two or three quarts of it should be put in a new bottle, which has been thoroughly rinsed several times with the same water that is being collected. The bottle should be plugged with an *absolutely new*, clean cork, previously well washed in the same water, and this bound over with a strong string, sealed with sealing-wax so that it may not be disturbed in transit. When the water is taken from a river or open spring, it should be dipped out below the surface; if taken from a pump or faucet, the water should first be allowed to run, so as to fully cleanse the pump or pipe. The sample should be sent to some chemist who has full laboratory facilities, and who has a reputation for correct analysis.

Hardness of water is so fully treated in the eighth report of this Board (1884) that we shall not consider it here. It must be remembered, however, that this and other mineral conditions are injurious to some persons.

Refer to the index of each State Report of the Board of Health as to water.

FILTERS.

Water which is discolored or impure in some form which may not be injurious, often needs to be filtered. Also water which contains organic matter can be much improved by passing it through filters.

Cisterns are often well provided with filters of their own, by having a partition of brick, so that the water is passed into one side and drawn through the other. A solid brick wall laid carefully in cement mortar, makes a good filter. The bricks should be rather underburned, and extending through from one side of the wall to the other, and the faces of the partition wall not covered with mortar. Water will filter through such a wall fast enough for the supply of a family, and if the rain all enters the cistern upon one side of the wall and is drawn out upon the other side, the water is clean and sufficiently pure. Such cisterns should be occasionally cleaned out and the partition wall scrubbed. If, by an ordinary bellows, air is blown through the brick septum from the side opposite to that on which the roof-water comes in, it helps to restore its straining power.

There are various forms of house filters, some of which are cheap and valuable. Flannel tied on the faucet of the water pipe will greatly improve the appearance of drinking-water, and will strain out

much organic matter. A tube or box with sponge in it will also be satisfactory in clarifying turbid water, and it is easily and quickly washed and replaced. A sheet of filtering paper as used by druggists and a glass or tin funnel furnishes a good means of filtering water on a small scale. A fresh sheet of filtering paper will be generally needed each day. Granulated animal charcoal, in boxes or vessels where the water can filter slowly through it, improves its appearance and quality. The chief idea of a filter is well illustrated thus:

Take any common vessel perforated below, such as a flower pot, and put a small, clean piece of sponge over the hole. Fill the lower portion with gravel stones, over which place a layer of finer gravel and on these a layer of clean, coarse sand, the proportion of each being about the same.

On the top of this place a lid of unglazed clay, either very porous or perforated with small holes, and on this a stratum three or four inches thick of well-burnt, pounded animal charcoal. A filter thus formed will last for a long time, is easily cleaned, and will be found to act both by mechanical and chemical purification.

The following are good directions from so good an authority as Dr. Parkes:

"The filtration of water is not difficult, even if you cannot afford to buy a regular filter. The compressed charcoal blocks are cheap and good; if they clog, rub them gently with a towel, or, if that does not clear them, with a hard brush; if they are still clogged, they must be gently scraped with a knife. But if the charcoal block is too expensive, a simple filter can be made as follows: Get a common earthenware garden flower pot; cover the hole with a bit of zinc gauze or a bit of clean-washed flannel, which should be changed from time to time; then get some rather small gravel, wash it very well and put it into the pot to the height of three inches; then get some white sand and wash it very clean, and put that on the gravel to the height of three inches; then buy two pounds of animal charcoal, wash that also by putting it into an earthen vessel and pouring boiling water on it, then, when the charcoal has subsided, pour off the water, and put some more on for three or four times. When the charcoal has been well washed, put it on the sand and press it well down. Have four inches of charcoal if possible. The filter is now ready, pour water into the pot, and let it run through the hole into a large glass bottle.

"After a time the charcoal will get clogged; take off a little from the top and boil it two or three times, and then spread it out and let

it dry before the fire. It will then be as good as ever. From time to time all the charcoal and the sand also may want washing. The sand may be put over the charcoal, and not between it and the gravel; but this plan sometimes leads to the charcoal being carried with the water through the gravel and out of the hole. The sand stops it.

"By filtering in this way, and by boiling the water, many dangers are done away with."

Another similar suggestion is as follows: It is that of a simple glazed earthenware jar, holding five gallons, or even less, having a double bottom. The upper bottom has a small hole closed by a bit of sponge; the space of four inches or so between the two bottoms is packed with clean gravel, above which is fine clean sand; the lower bottom is perforated with very fine holes through which the water slowly passes to an earthenware vessel below, into the top of which the filtering vessel tightly fits. The water is drawn off from the lower vessel by a faucet. If this lower vessel is unglazed it will serve at once as a cooler and reservoir. Such filters and reservoirs are now largely made, except that the reservoir is also glazed, necessitating in summer the use of ice, for such filtered water is very flat at first.

Another form of filter, as suggested in the last report of the State Geologist, is as follows:

"The most practical form of filter for household use, and one that will easily filter a pitcher full of water in a short space of time, can be made out of a bottle. The best form is the long kind in which sweet oil is sold, although almost any kind of glass or earthenware bottle will answer. The bottom of the bottle is cracked off, and the sharp edge removed by rasping with a file. The cracking can be done by tying a thin, soft string, soaked in turpentine, around the place where it is intended to crack, leaving as small a knot as possible, then setting fire to the turpentine, holding the bottle bottom up. After allowing the oil to burn for an instant, the end of the bottle is placed quickly in cold water, when, if the operation has been rightly conducted, an even crack will be produced, and the bottom of the bottle will come off easily.

"A layer of cotton is now placed in the bottle. The cotton must be worked in water, preferably warm water, in order to remove the adhering air, and to wet it well. A wad of the wet cotton is dropped into the bottle and covers the mouth of the neck. Other pieces are dropped in, care being taken to build the layer up evenly, and to add the cotton in rather small pieces. After dropping them in, they

should be pressed down and arranged by means or a rod. In this way a layer is made which should be from two to three inches thick. It should not be pressed down too tightly, else it may filter too slowly; neither should it be too light, or water may form channels through it. After a little use the plug generally adapts itself. Particular care should be taken to be sure that the cotton is snug against both sides, since the water is liable to escape there. The plugs, however, are easy to make, and a few attempts will soon teach one all the necessary manipulations.

"This bottle filter can be suspended or supported in any convenient way. Perhaps the simplest support is a block of wood having an auger hole bored through the center, and the edges of the hole reamed out. In this hole the bottle sits securely, and the bevel of the hole catches the shoulder of the bottle, thus holding it upright."

It is advised that the water to be filtered should be well stirred with alum added in the small amount heretofore named (two grains to a gallon, or one-quarter of an ounce to fifty gallons), and this poured through this filter pipe. It will run through in a considerable stream from the bottom, and can be caught in any convenient vessel, or a water holder both above and below can be combined with a filter thus made so as to be movable. The cotton used is simply the usual cheap white cotton batting. It makes a coherent filtering layer, and when clogged by use can be cleansed by boiling up in water and rinsing, or, as it is so cheap, can perhaps as well be thrown away and replaced by new.

Such precautions, and even boiling of water before such filtering, are worthy of thought, not only when any wide-spread epidemic prevails, but also when there is any good reason to suspect impurity of water-supply. It is to be remembered that wells once found good generally remain good, unless they receive foreign matter from errors on the part of their owners, which is too often the case.

Where there is the least suspicion of the well-water it is best first to consult the family physician, who may aid in the more simple tests; but if there is good reason for suspicion he will advise you not wholly to rely upon these approximate results, but direct you to those who have more experience in the work, and the advantages of laboratories with all appliances needed.

May, 1885.

Copies of this and other circulars can be had for distribution by addressing postal to E. M. Hunt, Secretary, Trenton, N. J.

LAWS RELATING TO PUBLIC HEALTH AND REFERENCES THERETO.

CIRCULAR LIV.

OF THE

STATE BOARD OF HEALTH OF NEW JERSEY.

AS TO LAWS RELATING TO PUBLIC HEALTH.

This circular contains all the laws or references thereto, relating to the public health, with notes and explanations attached thereto. Any Boards of Health or individuals not yet furnished therewith, may have the same by sending postal, with name and post office address, to State Board of Health, Trenton, N. J.

CIRCULAR LV.

OF THE

STATE BOARD OF HEALTH OF NEW JERSEY.

SANITARY SURVEY OF SCHOOL-HOUSE

In District No...............

Township..

County..

By..

Date................. ....

TO THE TEACHERS OF THE STATE.

TRENTON, N. J., September 1st, 1885.

The interest which has been manifested by teachers in former school circulars of the State Board of Health, and the essential relation which the condition of school-houses and the physical care of school children

bear to the public health, have led to the preparation of this circular. Please fill out carefully, keep one copy on file for the trustees, and send the other by October 15th, in wrapper, to the address of the State Board of Health, Trenton, N. J. By order of the Board.

E. M. HUNT, M.D.,
Secretary.

This circular has been sent in small book form to every school in the State, with space for answers and remarks.

QUESTIONS.

1. Building, how located as to elevation and drainage?
2. Size of house?
3. Is it brick or wood?
4. Has it a cellar or basement?
5. If so, state its condition—whether wet, damp, dirty, dark, unventilated, cemented or floored, etc.
6. Size of school-room? Give number, length, breadth and height, that the cubic space may be computed. (See diagram, last page.)
7. Is there an entry?
8. Is room wainscoted? Kind of wall?
9. Number of doors? Correct answers to 9 and 10 are necessary to ascertain lighting surface.
10. How many windows?
11. Size of windows and glass?
12. Distance from ceiling?
13. Are the windows to the right or left, behind or in front of the scholars?
14. What is the size of the yard?
15. Is it fenced?
16. Does water ever stand in the yard or beneath the house?
17. Is it well heated, and how? Is there dust? Is water supplied to stove or furnace?
18. Do you register by thermometer? Is temperature even?
19. Is it well ventilated, and how? If by ventilating registers, state whether they are in ceiling overhead, or in flues at bottom or top of room, or both. Also, if there is any provision for allowing fresh air to enter the room?
20. If by windows, have you ways of preventing draught?
21. Are the blackboards placed between the windows? Blackboards, if possible, should be on side where there are no windows, on account of less reflection of light.
22. Are the surfaces in good condition?
23. What is the source of water supply?
24. If from wells, give depth. Is there any privy vault, stable, sink-drain, or cesspool near? See diagram, and mark, as nearly as possible, the distance in feet from such sources of pollution.
25. Is the well protected from all surface pollution?

26. Is the condition of the well carefully looked after? (See Circular LIII., of Board, as to water-supply.)

27. Are there two privies belonging to the school-house?

28. How many feet from school-house?

29. Are the buildings kept in good order?

30. Have they vaults?

31. How often cleansed or disinfected?

32. How is it done?

33. Do trustees or others inspect buildings and school monthly? Have you a janitor?

34. If water-closets are in use, in what condition are they kept?

35. Are they always flushed with an abundance of water?

36. Are they odorless?

37. Are there any offensive or dangerous nuisances near the school-house, such as barn-yards, slaughter-houses, stagnant pools, etc.?

38. Is the law providing for vaccination attended to?

39. Are pupils from families where infectious or contagious diseases are prevailing excluded from school?

40. Are all the doors hung to swing outward, as the law requires?

41. In what year was the school-house built?

42. Is it a suitable house for the district? If not, state reason why. Has it proper places for hanging garments, hats, etc.?

43. Are seats and desks fitted to the size of the scholars?

44. How many pupils can be comfortably seated in the building? Is any room too crowded?

45. What is thus far the average daily attendance this quarter?

46. How many of your pupils are near-sighted?

47. Have you known pupils to become near-sighted while attending school?

48. Are there curtains, or inside or outside blinds to the windows?

49. How and to what extent is either physiology or hygiene taught?

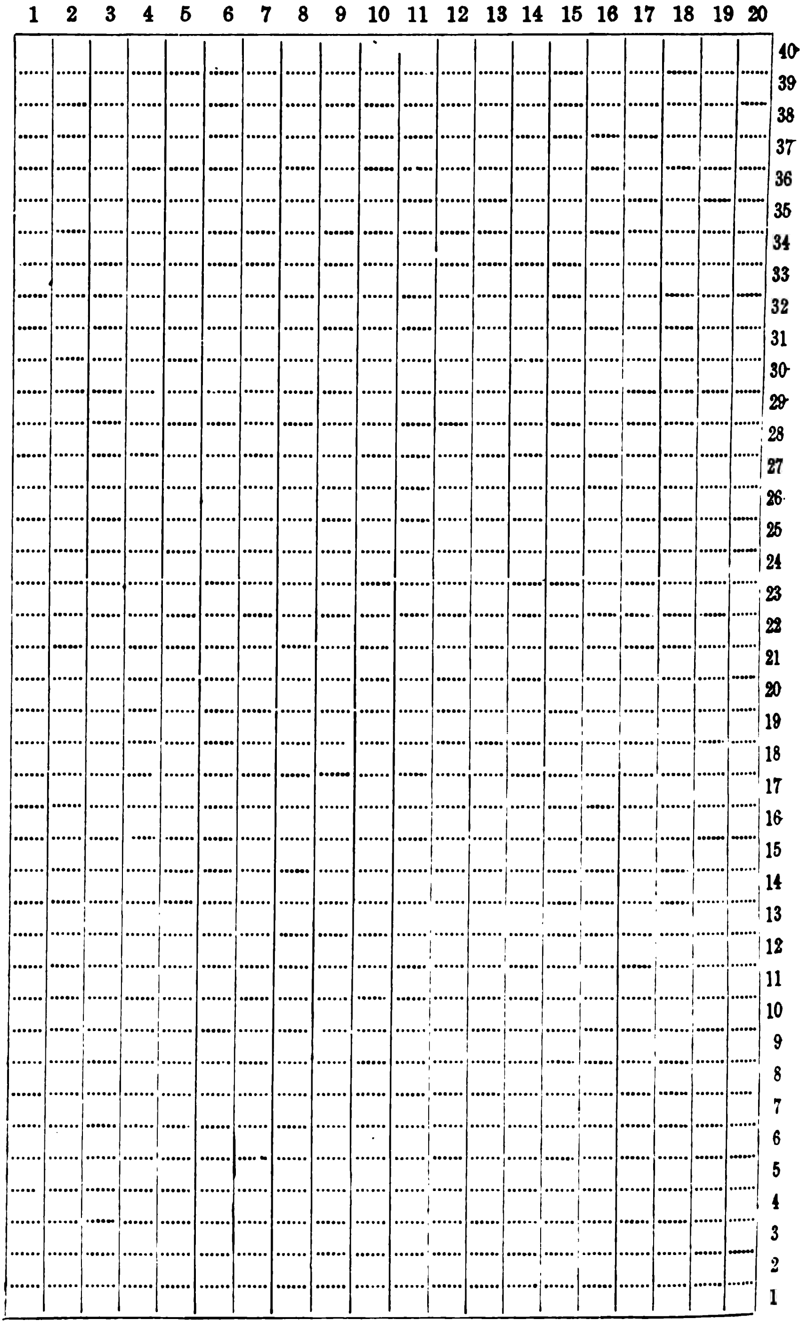
50. Is there provision for hand and face-washing?

General remarks as to needed improvements.

[For explanation of the following diagrams, see page 320.]

PLAN OF PREMISES.

(See Illustrative Plan and Explanations.)

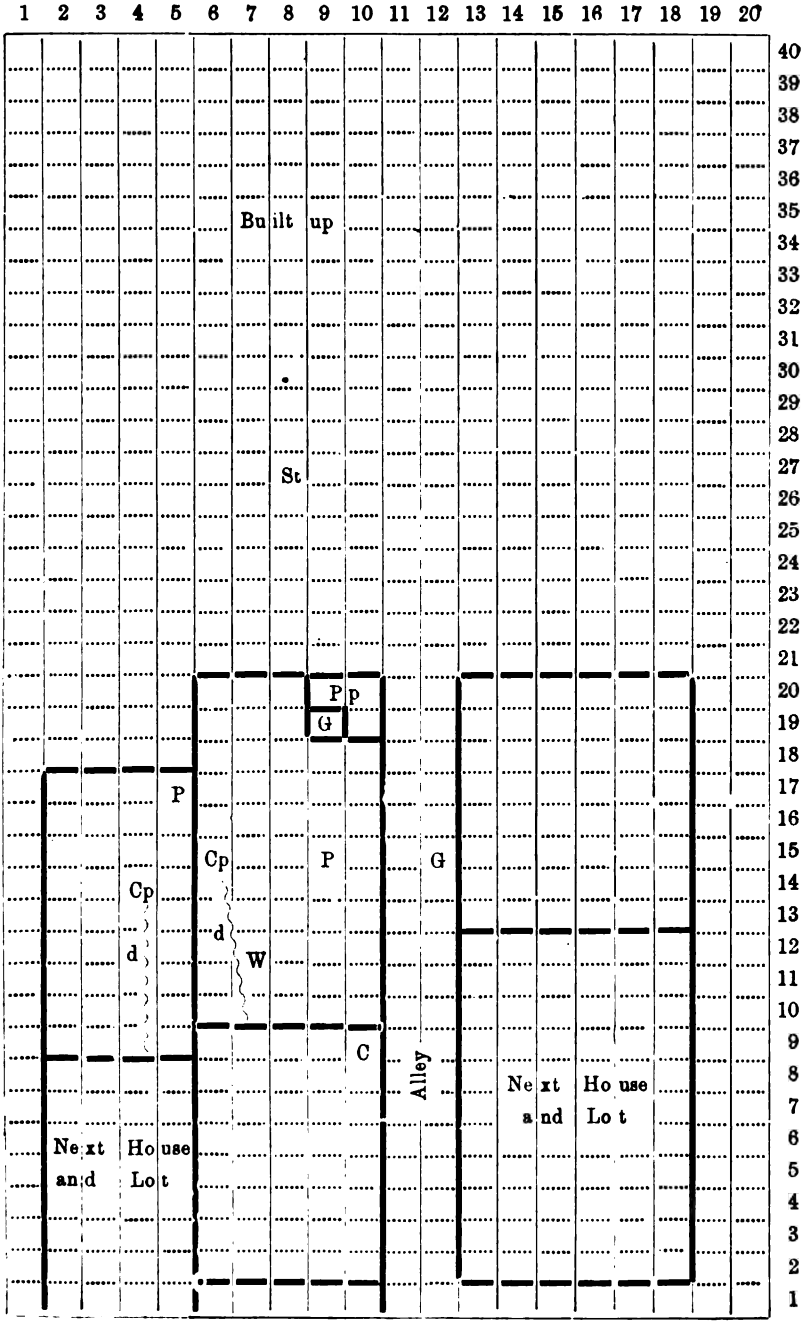


Scale, 5 feet to square.

Front: N. E. S. W.

SPECIMEN OF MARKED PLAN OF PREMISES.

South Street.



No. 24. 26

Spring Street. Front: N. E. S. W.

Opposite Bone Crushing Factory.

EXPLANATION.

These spaces in the diagram represent areas of 5 feet square, or a total area of 20,000 square feet—the dimensions of the block being 100 feet by 200 feet.

Taking the bottom line for the front of the lot, indicate by a pencil line the size and shape of the lot—leaving a margin on each side, if there be room.

Next, outline the size and location of the house and other buildings.

Then indicate by letters the location of the well (by *W*), cistern (by *C*), privy (by *P*), cesspool (by *Cp*), garbage (by *G*), stable (by *St*), pig-pen (by *Pp*).

Also the course of drain or pipe from the house by a dotted line with the letter *d* at the waste-pipe of dotted middle if it is a Drain to cesspool, or by the letter *S* if it be to a Sewer.

Part of the Diagram may also be used to show size of rooms, ventilating, heating, etc., if the lettering is explained. Thus the location of desks and stove may be shown.

The frontage is designated by crossing out the points of compass toward which the building does not face.

STATE OF NEW JERSEY,
DEPARTMENT OF PUBLIC INSTRUCTION,
TRENTON, September 1st, 1885.

To the Teachers of New Jersey:

I desire to express my appreciation of the importance of this sanitary inquiry, and to ask for a careful, accurate and punctual response thereto. In our work of training the minds of our children we should not overlook their physical health and welfare. In this effort to secure information, and in all their efforts to remedy existing sanitary evils connected with our schools, the State Board of Health has my hearty co-operation.

These reports are not for publication, but for the information of this office as well as of the Board of Health.

EDWIN O. CHAPMAN,
Superintendent of Public Instruction.

CIRCULAR LVI.

OF THE

NEW JERSEY STATE BOARD OF HALTH.

TRENTON, October 1st, 1885.

To Local Boards of Health:

Enclosed herewith please find an outline for the annual report for the year ending with this date.

In addition to the name and post office address of each member of the Board, give also the same as to the Sanitary Inspector. The law now requires that each city, town or borough of over two thousand inhabitants shall have a *competent* Sanitary Inspector. In all the larger townships, or in those which have villages of several hundred persons, it is provided by law that the State Board may require a Sanitary Inspector to be appointed, if in its judgment such an appointment is needed. Also, where there is no such distinct office or officer as a township physician in a township, the State Board appoints the medical member of the Board of Health whenever notified of a vacancy.

Under the schedules of subject for report in the case of cities and townships which have had Boards of Health and reported in previous years, it will not be necessary to repeat as to *A*, *B*, *G*, *O* and *P*, as most of the facts are on file.

In every case of report from a township, the name of any city, town or borough in it which has a separate Health Board should be given.

Under *A*, in the case of all cities, towns or boroughs, it is desirable to give the number of acres included in the incorporation.

C. Under *C* state exact source of water-supply. If a public supply, is it by the city or a private company? How many houses take it? Is the water ever discolored? Has it an iron or other taste? Is it hard or soft? Is it bad at any one season of the year? Are reservoirs or water-pipes cleaned? Does the source or stream from which it is taken receive any sewage above the point of supply? If from a stream, is there any examination made each year, or oftener, as to modes of pollution? Any other facts as to source,

quantity or quality. How many depend on wells? How many on cisterns?

D. As to drainage, state whether any system of drainage for the ground is used as distinct from sewerage. Is the usual water-level such as to secure dry cellars? If there are swamps near you, or malaria is frequent, give particulars.

As to *sewers*, state their construction, their grade or fall per one hundred feet, their size, their outfall, their flushing and ventilation, and whole length.

F. State whether houses generally have basements or cellars. If a city, whether the basements are occupied; if country, whether largely used for storage of vegetables. How many tenement-houses of more than two families? Is there a yearly house-to-house inspection?

H. State how far sewers are used, and what proportion of houses connect with them. If cesspools, state whether they are cemented, or whether built with open bottom or sides. How are they emptied? What is done with the contents?

J. State any known or prevalent diseases this year, and what month. Does the assessor inquire each year as to losses of animals, and as to contagious diseases? If a city, is there a register of all persons keeping horses, cows, hogs, etc.?

K. Are slaughter-houses inspected, so as not to be a nuisance to neighbors?

L. State as to any manufactories, and any evil to health therefrom.

S. State who neglect returns, and their post office address.

Look carefully at each heading and state what you know.

Under *W*, do not put down a disease as prevalent unless you have personally known of at least ten cases. Often the physician of the Board should make out or aid in the report, and add such suggestions as occur to him; but let there be no delay to make return during October. We must trust chiefly to the assessor, the physician and the inspector to keep the other members of the Board acquainted with health conditions, and with the rights and duties of the Board. Any neglects reported to us will be inquired into. Refer to Circulars XXXIX. and LIV., before sent you, for further suggestions.

We send also, occasionally, blanks for lists of physicians and undertakers, to be carefully corrected and promptly returned to this office. Cross off any deceased or removed, or who have ceased to practice. Add all new ones who have settled for practice within the

city or township for which you make return. Give name and post office address plainly.

Keep informed as to the laws, and distribute the various reports and circulars of the Board. One or more members of your local Board should attend the meeting of the New Jersey Sanitary Association, held in November in each year, at Trenton. Local Boards now have nearly or quite all necessary power. Even in small and very healthy townships, the local Board should confer at the time the township committee meets, and keep so informed as to prevent nuisances or deal with any outbreak of epidemic. On receipt of postal, a copy of laws and references, or other circulars, is sent to each member of the local Board whose post office address is given.

Let the Schedule, carefully filled out, be mailed to us in envelope herewith sent, by November 1st.

E. M. HUNT, M.D.,
Secretary.

CIRCULAR XLV.

OF THE

NEW JERSEY STATE BOARD OF HEALTH.

CHOLERA.

Whenever the possibility of an outbreak of cholera is threatening, all methods for thorough cleanliness should be applied with renewed vigor. For it is a mistake to suppose that cholera falls like a thunderbolt and accomplishes widespread destruction without regard to locality. On this point the Cholera Commission of the German Empire, convened in 1873, which has met from time to time since and reported (1882), is full and explicit. "The most important part is played by the locality itself to which the disease germ is brought." It depends in part on "the saturation of the soil with the decomposition of certain substances, and a condition of soil which favors such decomposition." Part VI., pages 314–318, says: "The commission expresses the united opinion of all the most experienced physicians when it says that the strictest attention to all the measures demanded by public general hygiene, offers the best protection against cholera."

Along highways of travel, as wherever else it lights, with occasional

apparent exceptions, an analysis of the facts shows the rule to be that its virulence is in proportion to the neglect of sanitary conditions. "It is spread more by infecting localities than by infected persons."

For these reasons city and village officers and all householders should see to it that no form of decomposable matter is kept on or about the premises, that all pipes are thoroughly flushed and ventilated, that there be close inspection of dwellings and surroundings, that pure water and wholesome foods are used, and where soil or cesspools are already filth-sodden and cannot be removed, that the disinfecting solutions herewith recommended be thoroughly and frequently sprinkled.

But because "all measures for the cleansing of the soil and its better drainage are too often too late when begun, at the time of the outbreak of an epidemic, all places should institute close sanitary inspection and proper cleansing in advance, so as to prevent an outbreak and limit its extent."

In dealing with epidemics which come from without, a great secret of success is in doing beforehand all that can be done to prevent the settling and spread of the disease, and in deciding just what you will do with the first case or cases that occur.

Whatever may be the differences of opinion, we are safe in acting on the basis that the following facts are settled as to cholera :

I. Although the view of direct contagion is not supported, transmission of the disease takes place, without doubt, in two ways: (*a*) From the patient, particles or secretions are thrown off which are not capable at once of acting as cholera poison, but which in a few hours are so changed as to become the specific poison; and (*b*) so, also, in the presence of such a center of infection, material for disease may attach itself to soil, locality and surroundings, and "whenever it finds appropriate conditions for its reproduction, it may light up an epidemic."

While these facts need not cause attendants to fear catching the disease, they are reasons why the patient should be isolated, why only persons needed should be in attendance, and why all in charge lose not the opportunity of dealing with materials and surroundings which, although not cholera-poisons, are quite sure to become so, or to be carriers of them, if nothing is done. Dirty persons with dirty clothing invite disease, and so personal cleanliness must be secured.

As persons may unavoidably be brought in contact with infected localities, such are advised to use, at time of exposure and before each meal, two grains of quinine, four drops of aromatic sulphuric acid,

and four drops of the tincture of chloride of iron, in a half table-spoonful of water which has been boiled.

In necessary visits to infected premises "consume nothing while there but the air you breathe, and carry nothing home."

What to do with the first case that occurs:

Consider that the wise management of it may not only determine the welfare of the patient, but of the whole community.

1st. Get the history of the case as soon as possible, and take care of all baggage and clothing and all that appertains to the patient. If you can control where the sick person is to be taken, seek isolation from other houses, if possible; if not, an isolated room, and avoid taking the patient into a notoriously unhealthy locality. In many cases we need to leave the sick where they are, and remove the well ones. Carry out a thorough system of disinfection, both in the treatment and as regards all surroundings of the patient. All laundry material should be placed in a disinfecting solution previous to removal or washing. Some things are best burned if soiled. With this memorandum before him, the health inspector or physician will direct as to what to do with each. He seeks to prevent the locating and transmission of the disease, as well as to save the patient. Read carefully Circular XLIV. on Communicable Diseases.

What to do with premonitory symptoms or with any purging disorder of the digestive tract:

Resolve at once to attend to it and control it, not because it is cholera, but because few who attend to such symptoms ever die of cholera, and because such attacks, if uncared for, seem often to invite the disease. If there is diarrhea, take a recumbent posture, apply a mustard plaster over the abdomen, and if there is a recurrence of the discharge, use the following prescription until you have time to seek medical advice:

Laudanum, Spirits of Camphor,	each *one* part.
Tinc. of Ginger, Tinc. of Capsicum,	each *two* parts.

Dose, for adults, one teaspoonful in a wine-glass of water. Or,

Compound Solution of Opium (Squibb's), Spirits of Camphor, Spiced Syrup of Rhubarb, Tincture of Capsicum,	of each, equal parts.

Dose, for adults, one teaspoonful in a tablespoonful of water.

How to take care of yourself and family during a cholera summer:

Practice a close adherence to all the ordinary rules of health. Most persons are best off where they can control all the circumstances of their condition, so as to be able to have good surroundings, good housekeeping, good, well-cooked foods, and conveniences for bathing, exercise, etc., and for immediate rest or care if there is sickness. Avoid cholera districts unless duty calls. Avoid public water-closets. Make no special change of diet, except to avoid those articles of food which you have found to occasionally disagree. Anxiety of mind, overwork, over-heating, and any irregularity of habit or of life seem to invite epidemic influences. The more we analyze facts, the more we find that epidemics do not fall on places or persons at random. While here and there the most correct and those best situated fall victims, with rare exception the imprudent, the exposed, the poor, are the chief sufferers. Be particular as to the use of water, unless you know its source. Tea, hot or cold, or coffee, or boiled milk can be used instead. If you have any suspicion of your own drinking-water, boil what is used for drinking.

DISINFECTANTS—HOW TO USE THEM.

Fresh air has no substitute. In order to cleanse places already infected, or being made so by sickness, there is need of *draught* through the room or building.

Hot Air.—Clothing or bedding is thus cleansed by being put in a furnace of dry heat of from 230° to 300° F. It should be subjected to the heat for about one hour.

Hot Water.—Very hot or boiling water is applicable to the cleansing of all garments, utensils, &c., admitting of such a method. Put them in when the water is quite hot, and allow it to come to a boiling point. Where garments have been soiled, it is well to throw them first into a tub containing a disinfectant solution, and from it transfer them to the water. They should never be removed from the room for washing before being placed in a disinfecting solution or boiling water.

(A.) *Iron Sulphate,* called, also, green vitriol, copperas, green copperas (2 cents per pound).—Stir in water until well dissolved, in proportion of one pound to a gallon. A teacupful of this solution should be in the utensil before using, or twice as much added to the water-closet each time of use. For use in sprinkling foul premises make it of double strength.

Carbolic acid solution (Squibb's No. 2) may be added to it in the proportion of one-tenth, or used alone.

(B.) *Solution of Corrosive Sublimate.*—One ounce to eight gallons of water; add four drams of permanganate of potash, or a little indigo, to give color to the solution, and so avoid mistake. Use the same as A.

(C.) *Chloride of Lime.*—A valuable disinfectant, chiefly because it contains from 25 to 30 per cent. of chlorine, which is liberated under proper methods of use. If purchased for cities, it should be tested as to the amount. The usual wholesale price is five cents per pound. It is not overrated as a disinfectant, if only its quality is known, and its mode of use is judicious. It needs slight moistening, frequent stirring, and sometimes the addition of an acid, as vinegar or common spirits of salt. The test of its efficiency is that the odor of it be kept constantly perceptible.

One-half pound to a gallon of soft water for utensils, sinks, water-closets, drains, &c. One ounce to a gallon of water for all linen, which must not be left long in the solution, but wrung out in fresh water. During an epidemic sprinkle dry chloride of lime over the contents of privy vaults, sinks and cesspools, etc., daily.

Chlorinated Soda, Usually known as Labarraque's solution, is a convenient liquid preparation, valuable for use in saucers in the sick room or in utensils. Its odor should be perceptible to strangers entering.

The chlorides are not to be used with carbolic acid.

(D.) To disinfect a room, ship or building so needing disinfection that its contents and surfaces cannot be easily dealt with singly, close the room or building, its windows, doors and chimneys, so as to exclude the outer air as far as possible. Vacate the house. Break roll sulphur in small pieces, place it on an iron plate or other metallic dish, and set this on a pair of tongs, or other crossbar, over an iron pot in which there is water, or over a large box of sand, so as to avoid danger of fire from small particles of burning sulphur. Light it by a few hot coals or some alcohol poured around the sulphur and lighted. Then leave and shut the door after you. Three pounds of sulphur is sufficient for 1,000 cubic feet of space. The sulphur will convert all the oxygen of the air into sulphurous acid, and all organic

particles are likely to be changed. Keep closed three hours after the burning has ceased, and then air well six hours before occupying. Clothing and bedding needing disinfection may be hung on lines and left in the room. Most furniture is not permanently injured, but needs dry wiping and then washing off afterwards.

(E.) *Lime—Plaster—Charcoal—Dry Earth—Sifted Ashes.*—All these have value, chiefly to be tested by the rapidity with which they correct odors. Fresh slaked lime should be scattered in all places of foul odor. It or charcoal or plaster may be scattered over heaps emitting foul odors. Calx powder is made by pounding one bushel of dry fresh charcoal and two bushels of stone lime, and mixing them, and is of great practical use.

All these substances absorb foul gases and dry up moisture, and so help to retard decomposition, or else absorb its results. Where lump charcoal is used it may be refitted for use by reheating it. Quick-lime and ground plaster should not be used where they may be washed into pipes and form lime soap or obstruct by hardening. Whitewash is always desirable where it can be applied to walls; wood-work and hard walls may be washed with the chloride solution.

(F.) One-half pound of sulphate of iron (green vitriol), or one ounce of sulphate of zinc (white vitriol), or one ounce of sulphate of copper (blue vitriol), or one ounce of chloride of zinc (butter of zinc), or one ounce of chloride of lime (bleaching powder), put to a quart of water—any one of these is available for neutralizing discharges or for sinks, used in quantities sufficient to cover the bulk they are intended to disinfect. Where any articles are to be moved from one place to another for airing and disinfection, as trunks, clothing, etc., they should be put in a bag or sheet like a pillow case, which is yet moist from having been wrung out in one of these disinfecting solutions.

To sextons and others in charge of the unburied dead:

Use any of the solutions named under F of fourfold strength for washing. Under and around the body (which should be early placed in the coffin, even if not closed,) use dry chloride of lime or the zinc chloride or the iron sulphate. The body may be wrapped in a solution of these or be placed in a solution in a water-tight coffin. When dry disinfectants only are used, fine shavings, or oakum, or tow, or

sawdust, mingled with the disinfectant, or with tar, should be placed beneath and around the hips. A plug at the lower bowel prevents after-purging.

Burial should be within thirty hours after death, and the coffin should not be closed early and *then reopened*, since this lets out concentrated and confined foul air.

For copies of circulars, send to E. M. Hunt, M.D., Secretary, Trenton, N. J.

CIRCULAR XXXIV.

Bureau of Vital Statistics, Trenton, N. J.

MARRIAGE, BIRTH AND DEATH RETURNS.

Copy of sections of laws defining the duties of Clergymen, Coroners, Physicians, Midwives, Undertakers, etc.

1. Be it enacted *by the Senate and General Assembly of the State of New Jersey*, That every minister of the gospel, justice of the peace, and other persons having authority to solemnize marriages, and the clerk or keeper of the minutes of every religious society in this State, before which any marriage shall be solemnized, shall transmit to the proper officer, as hereinafter designated, a certificate of every particular marriage solemnized before him, within thirty days thereafter, which certificate shall show the name, age, parentage, birthplace, occupation and residence of the parties married, the time and place of the marriage, the condition of each of the parties, whether single or widowed, the name of the clergyman or magistrate officiating, and the names and residences of the witnesses; any clergyman or magistrate neglecting to send such certificate shall be liable to a penalty of ten dollars.

Neglect on the part of those solemnizing marriage to report the same, not only incurs the penalty, but often causes great inconvenience in securing evidence as to questions of legal validity. It is the right of each married person to have this recorded evidence, besides the need of these returns in the study of social conditions and of the moral as well as the civic welfare of society. Those in charge of the various religious bodies at their annual, semi-annual or quarterly meetings should not fail to call attention to this duty of monthly report, and to the breach of law and ethics which the oversight involves.

2. *And be it enacted*, That it shall be the duty of the physician, midwife, or other person present at the birth of every child born, and in case there be no physician or midwife present, it shall be the duty of the parent to report in writing to the proper officer within thirty days thereafter the following particulars as far as known: the day of the month and year of the birth, the precise place of residence, the names of both

parents, and the maiden name of the mother, the birthplace, residence and occupation of the parents, and the sex and color of the child, and its name, if it be named, also the name of the attending physician, under a penalty of thirty dollars; *and it is also provided*, that any assessor of a township at the time of his annual assessment, in case he finds any return of a birth not made as herein provided, may fill out the certificate of the same on the usual blank, signed by himself as assessor and marked "special return," and said return shall be valid as a record of the birth, but shall not excuse the attendant for neglect of return.

The decisions of the medical profession (see English Registrar-General and Privy Council Reports and article on Vital Statistics, Vols. I. and II., Report of New Jersey State Board of Health, and Transactions of Medical Society of New Jersey, 1878,) and of the courts, (see Supreme Court, Iowa, Robinson *v.* Hamilton; Report of Iowa Board of Health, 1883, and New Jersey Board of Health Report, 1884, page 284,) authenticate it as a part of our duty to make these reports, besides the obligation which law and the general interests of society imposes. If physicians will carry a few blanks in the pocket-case or visiting record, there is but little inconvenience. Books also are now provided with birth and death blanks in such a form as to be handy. The fact that in townships the assessor is allowed to make special return in neglected cases will not be allowed to take the place of the requirement of return from the attendant, but is used as the means of informing the Bureau of Vital Statistics of any cases of neglect of return. Assessors should inform those concerned of the penalty for such neglect.

3. *And be it enacted*, That no sexton, undertaker or other person shall hereafter bury within this State, or bring into or remove from this State, the body of any deceased person, without having first received a permit from the proper authority of the county, city or township wherein such person may have died, and, if so doing, said sexton, undertaker or other person shall be liable to a penalty of fifty dollars; *provided*, that in burying any deceased person who died in any township in this State outside of city limits, or county health board limits, the certificate of any regularly graduated physician of the township wherein the person died shall be held by the sexton or undertaker as the only necessary burial permit, to be disposed of by him as hereinafter provided.

4. *And be it enacted*, That in case of any person dying within this State, it shall be the duty of the physician who may have attended him during his last illness to furnish the undertaker, or any member of the family applying therefor, a certificate of the death of said person, which certificate shall show the name, age, sex, color, nativity, occupation, last place of residence, place of death and the cause of death, according to the best of his knowledge; and said certificate shall constitute all the necessary burial permit in any township of the State, outside of city or incorporated or county health board limits, and the undertaker shall, within five days after said burial, send the same, by mail or otherwise, to the assessor of the township in which the deceased died, under a penalty of fifty dollars, as herein provided; *and furthermore it is provided*, that any undertaker residing in an incorporated city or town may present the certificate of death, in case of any burial which he is superintending, to the city clerk or other proper officer of said city, and receive the usual permit as issued by it, on condition that said clerk shall at once transmit said certificate to the assessor of the township in which the person died; *and in case there has been no physician in attendance*, some member of the family, if there be any present, if not, any one present,

shall notify a physician of the death at once, and the physician shall proceed to view the dead body and ascertain all the facts necessary, and, if satisfied of the cause of death, grant the township certificate for burial, and, if not satisfied, shall send at once for the county coroner, or county physician, or justice of the peace, who shall take charge of the body and investigate the same, and if any person present at the death of any person shall refuse or neglect to comply with the requirements of this act, they shall be liable to a penalty of ten dollars, and the physician shall receive one dollar for viewing a dead body and granting a burial certificate, provided said physician has not been in regular attendance on the deceased, if so, no extra charge shall be made by said physician.

5. *And be it enacted*, That in any case where, on account of the absence of the proper officer, or for any other sufficient reason, it may be impossible to obtain from said officer a permit in time for burial, it shall be lawful for any judge of the court of common pleas, or any justice of the peace of the county in which the person died, on being satisfied as to the correctness of said certificate, to issue a permit for burial in the following form: "It being impossible to obtain a burial permit from the proper officer on account of [here stating the reason], I hereby grant this special permit for the burial of ———, whose death has been duly certified to me;" the said judge or justice of the peace shall at once copy upon the back of said certificate the permit as granted, and mail the same to the office of the secretary of state at Trenton, marked on the envelope "burial permit;" and the undertaker or other person, on the receipt of such special permit, shall pay to the said judge or justice granting the same the sum of fifteen cents.

6. *And be it enacted*, That any person who shall knowingly make any false certificate, statement or receipt, relative to any marriage, birth or death, under the action of this law, shall be judged guilty of a misdemeanor, and on conviction shall be punished by fine or imprisonment, or both, at the discretion of the court.

7. *And be it enacted*, That the proper officer to receive the certificates of marriages, births and deaths, and to grant permits for burial, shall, in any incorporated city or borough, be the city clerk or other officer charged with these duties, and in any county having a similar officer appointed by a county board of health now organized, be such person or persons as said incorporated city or county board of health has authorized or may authorize, and in townships the assessor; but in townships outside of city or incorporated borough or county health board limits, the burial certificate given by any regularly-graduated physician shall constitute the burial permit as herein provided.

These sections are so explicit as to only need enforcement rather than explanation. The burial of a person in this State without Certificate or Permit, or the failure of a person in charge of a burial to return the same according to the city law or according to this law as provided in townships, is so hazardous that it is not likely to occur. There is only need to ask of physicians and others in making out certificates that they be as exact and full as possible in the statement of facts, and that the returns of cause of death be such as the Leaflet to Physicians indicates. Such terms as general debility, dropsy, old age, sore throat, etc., are rarely defensible. On the other hand, cholera, typhus and typhoid fever, diphtheria, cerebro-spinal meningitis, should not be attached as names unless the specific character is clear. As the best practitioners are sometimes the least positive as to the immediate cause of death, where there is doubt "Ap" for approximate, may be marked after the disease named.

In the interest of Public Health it is often well for the physician to state how

prevalent the disease is at that time, if it is at all endemic or epidemic, and to note on the back of any certificate the prevalence of any disease which has been so mild as not to cause death. No physician should report a disease prevalent in his own practice unless he has had at least ten cases during the month.

In case of death, physicians will save undertakers trouble by leaving the certificate at the house of the deceased, or by having it ready at their own offices, so that it may be had when called for in their absence.

When in case of sudden death for which a physician finds he cannot give certificate, a coroner or county physician, or a justice of the peace acting as coroner, is called, said officer gives the certificate of death as would the physician in other cases, and signs his official title. Where a physician, as provided for in section 4, *views the dead body*, the one dollar which he is entitled to is not regarded as including a proper fee for mileage or any detention, and is payable by the same board or disbursing officer as would pay the coroner in whose stead he thus acts.

NOTE TO CITY CLERK AND ASSESSORS.

This copy of the printed sections of the act, etc., may be sent at any time by assessors or city clerks to any persons neglecting their duties under the law, or to any new physicians or ministers, etc., moving within their bounds. None, however, can plead ignorance of the law from not having received such special reminder. The names of physicians, ministers, undertakers, and all required to make returns, should be kept by each assessor or city clerk in a small book. This Bureau should be notified especially as to changes of physicians and undertakers. In the case of the death of an assessor, the collector acts in his place until the vacancy is filled. See Chapter CLV., sec. 5, Laws of 1880.

It will always occur that some are negligent in making their reports. It is now the duty of all assessors and town clerks, at least each three months, to closely note those who fail to make returns, or whom they have reason to believe overlooked some. When this is done full returns are obtained. In case of continued dereliction, we have not failed in a single case reported to us to secure the returns.

Assessors and city clerks will send on the 15th of each month the certificates up to the 1st of the month, and place on the outside of the envelope memoranda of contents, so as to compare accounts. When an assessor goes out of office he should include in his monthly return all certificates in hand at that time, together with the name and address of his successor. As the time of administering oaths to officers after the March election varies from the middle of March to April, we close the fiscal year as soon as returns up to April 1st are received, so as by May 1st to send order for amount due, unless asked for sooner. All clerks of incorporated cities may have their receipt for returns twice a year if they prefer.

Payment is due on the presentation of the certificate for returns from the secretary of state as thus provided in the law:

And be it enacted, That such assessor, clerk or other officer, upon receiving a certificate rom the secretary of state as to the whole number of marriages, births and deaths returned as aforesaid, shall be entitled to receive from the collector of the township or other proper disbursing officer, ten cents for each marriage, birth or death so returned, the receipt for which shall be attached to the said certificate, and no payment shall be made unless the certificate be produced. This allowance includes postage.

In cities the "proper disbursing officer" is the one *who pays the usual city bills.*

A question as to disinterment and reburial is answered in a former circular, as follows:

"In such cases the following written certificate, signed by the undertaker conducting the reburial, and presented to the assessor or city clerk, will be sufficient for the issue of permit:

[FORM.]

"We, the undersigned, by the consent of the proper persons, request that a permit be issued for the disinterment of the body of ———— ————, who died about ————————, and for reburial at ———— ————. We assure that in said removal no other grave shall be disturbed, and that the transfer of the body shall be so made as not to endanger the public health.

Signed, ———— ————,
———— ————."

May physicians, etc, make their returns of the births of other townships in the township or city where they reside? This would lead to confusion, as then the assessor cannot know whether proper return has been made from his district. When the practice of a physician is much outside of the township or city in which he lives, it is easy for him to leave returns with parents at his first visit, and direct them to hand to the assessor, or himself to arrange with the assessor as to sending them.

With the returns made October 15th, of each year, all city clerks and assessors are requested to send us the names and P. O. address of any new physicians who have commenced practice since the report of the former year, and of any who have removed or have died. Designate, as far as you can, the sect of practice—those of the Prevalent, or Old School, being marked (A), those of the Botanic (B), those of the Eclectic (E), those of the Homeopathic (H), and Midwives (M). We may thus know whether those signing their names to birth and death certificates have somewhere received education or license, and have registered their diplomas as required by law.

All persons who have to do with obtaining or furnishing the various blanks and returns will, on request by postal directed to this Bureau, receive a copy of the annual report of the State Board of Health as issued in January of each year, unless the supply has become exhausted. Books for pocket use, containing 50 Birth and Death blanks or 50 Birth blanks alone, are now furnished to all physicians requesting them, through the assessor or city clerk or by postal. Persons out of blanks may send for same by postal directed to E. M. Hunt, M.D., Med. Supt., or Dallas Reeve, Registrar, Trenton, N. J.

MEDICAL REGISTRY.

By an act approved March 12th, 1881, and the supplement thereto, approved March 22d, 1883, it is made the duty of every person pursuing the practice of medicine and surgery in this State to record his diploma, with date and place of graduation, or in case of twenty years' practice a certificate thereof in the office of the County Clerk of the county where the practitioner settled. While the law was not suggested by this Board, it is believed to be somewhat in the interests of the public health. It is right that the public should know how those who claim to be practitioners of medicine have been authenticated. Then if they employ incompetent persons they do it with less excuse. The errors of physicians are not so easily detected as those of druggists, and yet law is much more ready to protect against risk from the latter than from the former. Educated medical practitioners may suffer from the audacity of patronized ignorance, but the people are the chief sufferers. This Board has not felt itself charged with the duty of seeking more stringent laws as to medical practice, but has too much evidence that there should be severer limitations upon the assumption of so responsible a calling. There should not be a discrimination between different sects or schools, but between knowledge and ignorance, between adequate preparation and unskilled pretense. Until legislation in the general interests of the people shall give better protection it will be wise for the people to inquire more fully into the sources of authority for medical practice. Under the present law every form of diploma presented is placed upon file and is subject to the examination of those whom it may concern. Hence, foreign certificates, imperfect diplomas, and even persons with no other claim to medical practice except that they have prescribed for some one disease for over twenty years, have offered papers for file. These records are valuable for information although not indicating the fitness of each person registered. They also point to others who, without even the semblance of authority, are imposing upon the credulity and the health of citizens. The lists furnished this year are as follows:

ATLANTIC COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Cadwallader, Willis D....	Atlantic City......	Mar. 5, '80	University of Penna., Phila.
Filomena, Carolinaia......	Hammonton........	June 10, '79	University of Naples, Italy.
Smith, H. M	....	Apr. 2, '82	Jefferson College, Phila.
Shippard, H. C..............	....	Mar. 12, '78	Hahneman College, Phila.
Snowden, John W.........	Hammonton........	Apr. 4, '84	University of Penna., Phila.
Walker, Mahlon W........	Atlantic City.......	Mar. 2, '67	....
North, Edward..............	Hammonton.........	—— —, '68	Jefferson Med. Col., Phila.

BERGEN COUNTY.

Flynn, Percival H. J......	Fort Lee............	Mar. 9, '82	Univ. of the City of N. Y.
Jehl, Eugene................	Park Ridge.........	June 28, '66	Long Island Col. Hospital.
Tygert, Martin..............	Carlstadt............	Feb. 4, '79	Albany Med. College, N. Y.

BURLINGTON COUNTY.

Beattey, Henry M.........	Florence.............	Apr. 2, '85	Jefferson College, Phila.
Davis, John W..............	....	Mar. 10, '81	Phila. College of Pharmacy.
Goble, Leon..................	....	Feb. 26, '85	Penna. Col. Dental Surgery.
Gibbs, B. Frank	Pemberton..........	Apr. 3, '85	Hahneman College, Phila.
Hammell, Walter G.......	Riverton	Apr. 2, '85	Penna. Col. Dental Surgery.
Kughler, George W., Jr...	Burlington	Apr. 2, '85	Jefferson College, Phila.
Stokes, Joseph..............	Moorestown.........	Apr. 13, '83	University of Pennsylvania.
Small, Alexander H.......	Riverside............	Mar. 15, '81	University of Pennsylvania.

In order to secure more efficiency in the Township Health Boards of the county, Dr. Wm. C. Parry, of Mt. Holly, has been appointed District Medical Inspector.

CAMDEN COUNTY.

Wescott, E Seymour......	....	Apr. 2, '83	Jefferson College, Phila.
Walker, Mahlon M........	....	Sept. 6, '67	Homeopathic, Phila
Forgey, Avinton...........	....	Mar. —, '73	Medical College, Ohio.
Artz, Gerome L	....	Mar. 10, '81	Hahneman College.
Henry, George W..........	....	Apr. 2, '85	Jefferson College, Phila.
Richardson, James.........	....	Apr. 2, '85	Jefferson College, Phila.
McAlister, Alexander.....	....	May 1, '85	University of Pennsylvania.
Glover, Lawrence L	....	Mar. 30, '82	Jefferson College.
Marcy, John Whilliden...	....	May 1, '85	University of Pennsylvania.
Carpenter, Robert	....	Mar. 29, '84	Jefferson College.
Brown, H. M................	....	Mar. 10, '69	Howard College.
Long, William S...........	....	....	University of Pennsylvania.
Powell, William R.........	....	Mar. 10, '77	Jefferson College.
Long, S........................	....	....	University of Pennsylvania.
Comly, Ezra, Jr.............	....	Mar. 15, '62	University of Pennsylvania.
Tegtmeier, C. T.............	....	....	Hahneman.
Jones, S. Preston...........	....	....	University of Pennsylvania.
Clausen, Joseph Robert...	....	....	Jefferson College.
Shannon, J. H..	....	....	Jefferson College.
Stroud, Frank G............	....	Apr. 2, '85	Jefferson College.
Richie, Robert W..........	....	Mar. 6, '—	Jefferson College.

CAPE MAY COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Urquhart, George W.	Sea Isle City	Mar. 10, '76	University of Pennsylvania.
Urquhart, David C.	South Seaville	Mar. 14, '79	University of Penna., Phila.
Way, Julius	Sea Isle City	Apr. 2, '85	Jefferson Med. Col., Phila.

CUMBERLAND COUNTY.

Blackwell, E. T.		June 14, '48 Mar. 13, '68	Vermont Medical College. University of Pennsylvania.
Brown, Henry N.		Mar. 10, '69	Howard Med. College, Mass.
Brown, Lewis W.	Vineland	Feb. 27, '65	New Col. of Hom. Med., N. Y.
Carr, Henry H.		Apr. 3, '85	Hahneman College, Phila.
Davis, Theodore G.	Bridgeton	Apr. 2, '85	Jefferson College, Phila.
Hubbard, Charles H.		Mar. —, '83	Hahneman College, Phila.
English, Wm. A.	Vineland	Mar. 26, '66	Hygeio Therapeutic College, N. Y.
Jackson, Moses J.		Mar. 1, '84	Eclectic Med. College, N. Y.
Judson, Andrea Rice	Dividing Creek	Apr. 2, '85	Jefferson Med. Col., Phila.
Wheaton, Joseph C.	Millville	Apr. 2, '83	Jefferson Med. Col., Phila.
Swinney, John G.	Shiloh	Mar. —, '79	Hahneman College.
Taylor, William	Vineland	Apr. 3, '47	University of Pennsylvania.

ESSEX COUNTY.

Adams, John Lincoln		May 12, '85	Col. of Phy. and Surg., N. Y.
Bradshaw, John H.		Oct. 2, '83	Medical College, New York.
Brown, Phœbe Day		Apr. —, '85	Med. Col. for Females, N. Y.
Brown, Jacobus S.		May 1, '85	Columbia College, N. Y.
Burn, Lucilla L.		May 20, '85	Elec. Theropathic Col., Phila.
Clossen, William Henry		May 12, '85	Col. of Phy. and Surg., N.Y.
Fubricius, Julius A.		Mar. 13, '73	St. Louis Medical College.
Frankendorff, H. von		Mar. 21, '60	Med. and Surg. Col., Munich.
Fonda, Edw. Stanley		Mar. 9, '85	New York Col. of Dentistry.
Grube, Charles Henry		July 12, '78	University of City of N. Y.
Glatzmeyer, Guilielmun		Mar. 1, '85	University of City of N. Y.
Hinkley, Livingston S.		Mar. 1, '78	Bellevue Hosp. Med. College.
Hitchcock, Harlyro		Mar. 11, '78	Medical College, New York.
Heberton, William		Apr. 16, '85	Homeopathic College, N. Y.
Hood, Bruno		May 2, '85	Col. of Phy. and Surg., N. Y.
Harman, George W.		Apr. 2, '84	Hahneman Med. Col., Phila.
Jemison, Alcinous B.		——, '78	Medical College, Ft. Wayne.
Kelly, Getrude Bride		May —, '84	Med. Col. for Females, N. Y.
Mulholland, John K.		Oct. —, '78	Hahneman Med. Col., Phila.
Van Metzradt, Hans		Feb. 26, '78	Rush College, Chicago.
Mieran, Charlotte S.		Apr. 4, '85	College of Midwifery, N. Y.
Pennington, Byron G.		Mar. 22, '81	Pennsylvania Med. College.
Stoll, Catharine		Aug. 19, '67	Acad. of Strasbourg, Germ'y.
Schurman, Margaret B.		Sept. 19, '85	College of Midwifery, N. Y.
Welch, Durant Clark		Mar. 8, '77	N. Y. Homeopathic Med. Col.

GLOUCESTER COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Brown, H. N		Mar. 10, '69	Harvard College.
Carr, Henry H	Five Points	Apr. —, —	Hahneman College, Phila.
Hilligass, Eugene Z	Mantua	Mar. —, '80	Jefferson Med. Col., Phila.
Luffberry, M. Jones	Glassboro	Mar. —, '84	Jefferson Med. Col., Phila.
Reading, George E	Woodbury	Apr. 2, '85	Jefferson Med. Col., Phila.
Stillwagon, Philip E	Bridgeport	Mar. —, '84	Jefferson Med. Col., Phila.

HUDSON COUNTY.

Atwell D. R. J		Apr. 16, '85	Hom. Med. Col., N. Y. City.
Brockway, Millard		Mar. 6, '81	Eclectic Med. College, N. Y.
Baumann, Louis		Mar. 10, '84	Univ. of the City of N. Y.
Converse, Charles Bell		Mar. 1, '71	Bellevue Hosp. M. Col., N. Y.
Fulken, Alex. E. E		Mar. 6, '81	United States Med. College.
Guerin, Lawrence V		May 22, '85	Columbia Med. Col., N. Y.
Herzog, Sophie (midwife)		July 4, '84	
Hoffman, Jacob		Apr. 3, '85	Hahneman Med. Col., Phila.
Jones, Eli Grellet		Nov. 1, '71	Dartmouth College.
Loomis, Albert J		Sept. 1, '84	Bellevue Hosp. M. Col., N. Y.
Luck, John T	Weehawken	Feb. 28, '68	Columbia Med. Col., N. Y.
Lutz, F. H		Mar. 16, '72	Hom. Med. Col., N. Y. City.
Muzzy, Arthur Thomas		Feb. 8, '79	Columbia Med. Col., N. Y.
Nevins, J. Lawrence		Feb. 28, '78	N. Y. Hom. Med. College.
McKenzie, M. V		May 13, '84	Col. of Phys. and Surg., N. Y.
Owens, William Henry		July 13, '79	Univ. of the City of N. Y.
Opdyke, Levings A		Apr. 16, '83	Hom. Medical College.
Pearson, John Clifton		July 3, '85	Agricultural Col. of Vermont.
Peffer, Henry		—— —, '83	Univ. of the City of N. Y.
Simon, Charles Irving		Feb. 8, '79	Columbia College, New York.
Spring, Frederick		Aug. 3, '83	Univ. of the City of N. Y.
Steadman, Evan T		Mar. 6, '85	Univ. of the City of N. Y.
Schlemm, Richard		Mar. 9, '85	Bellevue Hosp. Med. Col.
Sanborn, Josiah Lane		Mar. 1, '35	Univ. of the City of N. Y.
Searing, Harry W		Mar. 9, '85	Bellevue Hosp. Med. Col.
Van Deventer, Johann L		May 13, '81	Columbia College, New York.
Weeks, James E		Mar. 6, '85	N. Y. Medical University.
Wolf, Charles Frederick		Mar. 9, '85	Bellevue Hosp. Med. Col.
Kreckler, F. (midwife)		Sept. 28, '69	Midwife Institute, Hanover, Germany.
O'Grady, John F		—— —, '80	Long Island Col. Hospital.
Phelan, Jeremiah D		June 9, '83	Collegii Hoscomii Insulæ Longæ.
Winges, Conrad	Jersey City	May 16, '83	Columbia College.

HUNTERDON COUNTY.

Alpaugh, William C	High Bridge	Mar. 1, '68	Bellevue Hosp. Med. Col.
Brown, Henry N		Mar. 10, '69	Harvard College.
Carey, Thomas H	Junction	Mar. 29, '84	Jefferson College, Phila., Pa.
Exton, H. Louisa	Clinton	Mar. 23, '79	Women's Med. Col. of Pa.
Hackett, William Y	High Bridge	Mar. 14, '67	University of Pennsylvania.
Huffnagle, John	Lambertville	Mar. 14, '66	University of Pennsylvania.
Jacobus, Atwood E		Oct. 2, '83	Col. of Phys. and Surg., N. Y.
Knight, William	Clinton	Mar. 14, '71	University of Pennsylvania.
Larison, Francis W	Lambertville	Mar. 13, '85	Col. of Phys. and Surg., Md.
Leidy, Edwin D		Apr. 14, '85	Jefferson College, Phila., Pa.

MERCER COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Stewart, Hiram A.		——, '63	Penna. Med. Univ., Phila.
Brown, Henry Nelson		——, '79	Harvard Med. Col., Mass.
McStruble, William		——, '85	University of Penna., Phila.
Thomas, Richard		Mar. 13, '62	University of Penna., Phila.
Shaw, Jos. B		——, '85	University of Pennsylvania.
McIlwaine, Charles H.		——, '77	University of Penna., Phila.
Hunt, Ellsworth E.		——, '78	Col. of Phys. and Surg., N. Y.
Encke, Joseph R.		——, '85	Phila. Electropathic Inst.
Jones, E. G		——, '71	Medical College, N. H.
Cantwell, Frank V.		——, '85	University of Pennsylvania.
Rogers, Elmer W		——, '85	University of Pennsylvania.
*Field, Isaac		——, '56	Receipt for cure of cancer and other affections from Dr. William H. Norris in 1856.

* Affidavit that he has practiced for the treatment and cure of cancer and other affections for thirty-six years in one locality.

MIDDLESEX COUNTY.

Baldwin, Frederick A.	New Brunswick	Mar. 10, '81	Bellevue Med. College, N. Y.
Davis, Irenaeus P.	Milltown	Mar. 1, '71	Bellevue Med. College, N. Y.
Edwards, Thomas P.	New Market	Mar. 6, '85	Univ. of the City of N. Y.
Freeman, Charles M.	Washington, D. C.	May 13, '84	Col. of Phys. and Surg., N. Y.
Harned, Samuel P.	Woodbridge	Mar. 5, '68	Univ. of the City of N. Y.
Phillips, Howard W.		Feb. 28, '68	Col. of Phys. and Surg., N. Y.
Shannon, Patrick A.	New Brunswick	Jan. 27, '74	Royal Col. of Surg. in Ireland
Titsworth, Abel S.	New Market	Mar. 1, '67	Bellevue Med. College, N. Y.

MONMOUTH COUNTY.

Betts, William A.	Red Bank	Mar. 14, '61	Columbia College, N. Y.
Beach, Edward M.	Eatontown	Mar. 7, '85	Maryland Academy.
Buckmaster, A. H.	Ocean Beach	June 19, '83	College, Long Island.
Bradford, T. Hewson		Mar. 11, '84	Jefferson College, Pa.
Booth, M. A.	Ocean Grove	Apr. 15, '51	Winchester, Va.
Gunning, Josephus H.	Ocean Grove	Mar. 10, '73	University, New York.
Lazarus, Solomon D.	Seabright	Apr. 2, '83	Jefferson College, Phila.
McKenzie, William V.	Asbury Park	May 13, '64	Columbia College, N. Y.
McGinnis, E. L'H.		June 19, '83	College Hosocomii, L, I.
Scotland, Alexander		Mar. 9, '85	Bellevue Hosp. Med. Col.
Taylor, Joseph William	Ocean Beach	Mar. 11, '84	University, New York.
Walker, Mahlon M.	Ocean Grove	Mar. 2, '67	Hom. Med. Col. of Penna.
Wythe, W. W.	Ocean Grove	June 6, '51	Philadelphia Med. Col.

MORRIS COUNTY.

Bennet, Robert A.		Mar. 5, '74	Hom. College, New York.
Frazer, Samuel H.		Mar. 7, '79	Eclectic College, New York.
Taylor, John L.	Succasunna Plains	Mar. 1, '80	Bellevue Med. Col., City N.Y.
Wolfe, W. J.		May 5, '85	Univ. Med. Col., N. Y. City.
Woodruff, Marietta H. C.	Boonton	Mar. 17, '74	N. Y. Med. Col. for Women.
Yarnall, James H.		Mar. 1, '83	Eclectic Med. Col., N. Y.

OCEAN COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Bennett, Henry Allyn....	....	——, '83	....
O'Hara, John................	Island Heights....	——, '85	Hahneman Med. Col., Phila.
Hewson, A....................	....	——, '79	Jefferson College, Phila., Pa.
Ketchenbach, Wm. H.....	Barnegat City......	——, '71	Bellevue Medical College.
Hawley, B. F., Jr..........	....	——, '82	Jefferson College, Phila., Pa.
Ecroyd, Henry, Jr.........	....	——, '83	University of Pennsylvania.
Paxton, Rutherford H....	....	——, '84	Med. Chirurg. Col.

PASSAIC COUNTY.

Armstrong, Samuel E.....	West Milford.......	Mar. 4, '85	Albany Univ. Med. Col.
Bachman, Fred............	Paterson	Aug. 21, '56	Med. Inst, Weimar, Saxony.
Buchanan, Rebecca R. M.	Paterson	May 21, '77	Amer. Eclectic Col., of Ohio.
Brown, M. Belle............	Passaic...............	Apr. 10, '79	N. Y. Med. Col. for Women.
Carroll, William H........	Passaic...............	Mar. 5, '84	Univ. of the City of N. Y.
Dittmer, Wilthelm C......	Paterson	Sept. 16, '54	Hospital Col.
McFarland, David Walter	Paterson	Mar. 6, '85	Univ. of the City of N. Y.
Peters, Charles H.........	Passaic...............	Mar. 16, '82	Col. of Phys. and Surg., N.Y.
Rink, Walter S.............	Passaic...............	Apr. 3, '85	Hahneman Med. Col., Phila.
Utter, Sylvester............	West Milford.......	Mar. 6, '85	Univ. City of New York.

SALEM COUNTY.

Brown, Henry N..........	....	Mar. 10, '69	Harvard College.
Smith, William Scott......	Hancock's Bridge.	June 27, '74	Brooklyn and Cincinnati, Ohio.
Wescoat, E. S	Quinton Bridge...	Apr. 2, '83	University of Pennsylvania.

SOMERSET COUNTY.

Follett, William Mann...	....	Mar. 1, '83	Eclectic Med. Col. of N. Y.
Edwards, David J.........	Liberty Corner.....	Mar. 8, '82	Univ. of the City of N. Y.
Kenney, Arthur............	Somerville..........	Mar. 13, '84	Hom. Med. College, N. Y.
Utzinger, Anna Weis......	Plainfield	Apr. 4, '85	College of Midwifery, N. Y.
Brown, H. N................	....	Mar. 10, '69	Harvard College.
Creveling, Philip G........	Raritan	Mar. 6, '58	College of Penna., Phila.
Matthewson, William B..	Somerville	June —, '81	Col. of L. Island, Brooklyn.
Anderson, J. E.............	Neshanic	Mar. —, '84	....
Costil, H. B.................	Rocky Hill..........	Mar. —, '82	University of Pennsylvania.

SUSSEX COUNTY.

Clark, Jeptha C............	Andover	Apr. 16, '85	Homeopathic Col. of N. Y.
Cusack, Thomas G.........	Newton	Feb. 13. '85	Univ. of the City of N. Y.

UNION COUNTY.

NAME OF PHYSICIAN.	P. O. ADDRESS.	DATE OF DIPLOMA.	INSTITUTION CONFERRING DIPLOMA AND LOCALITY.
Alexius, Aurora	Elizabeth	July 1, '43	Bromburg Inst., Posen, Ger.
Beckwith, Seth B	Elizabeth	——, '53	Cleveland Hom. College.
Beckwith, John Tifft	Elizabeth	——, '84	Cleveland Hom. College.
Boseo, Otto	Rahway	Mar. 23, '67	Rush Med. Col., Chicago, Ill.
Carman, George Pell	Plainfield	Mar. 5, '79	U. S. Med. Col., N. Y.
Colford, Henry	Plainfield	Sept. —, '82	Med. Col. of Baltimore.
Grier, E. B	Elizabeth		University of Pennsylvania.
Kiengle, Agathe, now Keller	Elizabeth	May 5, '80	Donaneschingen, Prussia.
Korthaus, Caroline, now Jacobs	Elizabeth	Apr. 24, '71	Barrnen Institute, Germany.
Livengood, Theodore F	Elizabeth	Mar. 12, '75	University of Pennsylvania.
Miller, David M	Elizabeth	Sept. 26, '82	Col. of Phys. and Surg., N. Y.
Morse, Willard H	Westfield	Mar. 5, '80	Albany Medical Col., N. Y.
Morton, Edward K	Elizabeth	May 13, '84	Col. of Phys. and Surg., N. Y.
Manning, Andrew J	Plainfield	——, '83	Columbia College, New York.
Schmidt, Charles J	Rahway	July 9, '84	University of Vermont.
Waelchli, Anna	Elizabeth	Aug. 30, '84	Columbia Col. of Mid., N. Y.

WARREN COUNTY.

Brown, Henry N		——, '69	Harvard College, Mass.
Dalrymple, Edward S	Vienna	——, '85	Univ. of the City of N. Y.
Johnson, Samuel H	Hackettstown	——, '84	Col. of Phys. and Surg., of Baltimore, Md.
Jacobis, Peter Nelson	Belvidere	——, '85	University of Vermont.
Tunison, Geoffrey O	Oxford	——, '85	Jefferson Med. Col., Phila.

REPORT

OF THE

BUREAU OF VITAL STATISTICS

OF THE

STATE OF NEW JERSEY

FOR THE

Statistical Year from July 1st, 1884, to July 1st, 1885,

WITH CENSUS TABLES AND CLIMATOLOGY.

DEPARTMENT OF STATE.

TO HON. HENRY C. KELSEY, SECRETARY OF STATE.

By EZRA M. HUNT, M.D., Sc.D.,

Medical Superintendent of Vital Statistics.

INTRODUCTION TO THE REPORT OF THE BUREAU OF VITAL STATISTICS.

The progress made in the oversight and tabulation of vital statistics in this State is such as to encourage all those who recognize that the care of pupulation and the prevention of preventable disease is a material concern and duty of the State. While there is much yet to be desired, and while it is only by the accumulation of facts over a large number of years, and by the comparison of all localities, that we can arrive at safe conclusions, already much light is being thrown on the localities and causes of disease. What has thus far been attained is due to the inquiry of many physicians of the State, and to the wise coöperation of legislative action. It is well to recall the steps of progress.

Halley, of England, the mathematician and astronomer (1693), who first ventured to predict the return of a comet which appeared on time in 1759—seventeen years after his death, so satisfied himself of the uniformity of the laws of nature, and of the possibility of determining events as to human beings by a close study of nature and the causes of deviation therefrom, that he invented the "Life Table," and became the author of a system on which has since been successfully predicated great mercantile, vital and scientific transactions. His investigations are to be found in the early records of the Royal Society. Taking the city of Breslau as a basis and noting the additional data needed for a more complete result, he prepared a table which gave a more just idea of the state and constitution of mankind than any one then extant, showing among other things the chances of mortality at all ages, and likewise how to make certain estimates of the value of annuity for lives, which had been previously done by an imaginary valuation. These are the materials on which must be based life annuities, life insurance, and the rules of friendly societies in the interest of the working population. The French table of Deparcieux

(1746), the Northampton table of Dr. Price, which he applied in the Equitable Insurance Society, and far better his life table of the populations and deaths in Sweden and Finland (1783), and the Carlisle table of Milne (1815), marked great advances in method, accuracy and the modes of allowance for defects.

In 1819 the English government found it best to extend aid in securing more perfect data. Under its sanction Mr. Finlaison labored for ten years, and in 1827 made a report to the Lords of the Treasury, in which he recommended "an accurate and extensive collection of facts whereby may be facilitated the solution of all questions depending upon the duration of human life." Since then vital statistics and life tables have been multiplying, and it can be said with more emphasis than it was said by the Registrar-General of England forty years ago, that "a system has been carried into effect which conduces to the amelioration of the condition of society, and especially of the working classes, and each year's accumulation will increase the value of such records, by augmenting the number of facts upon which calculations may be brought to bear." Sources of error are distinctly traced, methods of tabulation are closely questioned. The fact that vital statistics are yearly assuming more and more importance, is itself the assurance that the science rests on an exact basis; that it is attainable, even if precise and resting upon profound mathematical relations; that as an art it is indispensable and practicable in life studies and a great assistance in studying those causes of disease which admit of prevention or limitation.

The relation of these statistics and the facts as to their record, are detailed as follows, in a report made by Dr. J. L. Bodine, to the New Jersey Sanitary Association several years since, before the present system was inaugurated:

"The object of sanitary science is to prevent disease and to prolong human life. It is essentially a science of observation, a science founded upon statistics. It necessarily makes use of the numerical method of observation, a method widely open to fallacious conclusions, but which, rightly used, is the basis of all sanitary reform. The necessity of some statistical records as a means of comparison of the condition of a people at different periods has been recognized from the earliest ages. The books of Moses give an account of the numbering of the children of Israel at several different periods, and the Roman census was taken every fifth year. A registration of births, marriages and deaths was a part of the old English parochial organization, and a voluntary

registry of such facts was provided for in several of the colonies of this country in connection with their township or other local organizations. In 1836 the English registration law was passed, and from that time in England a registry of births, marriages and deaths became general, and was made a special governmental function. The reports of the Registrar-General of England have furnished the groundwork for the great development of sanitary science which the last forty years has brought about in England. This movement in England made an impress on this country, and in 1842 a registration law was enacted in the State of Massachusetts. As a part of this same movement, and influenced by the work of the English Towns Commission, a special commission in Massachusetts in 1850 made an exhaustive report of what statistics had done to inform and to educate communities in regard to the avoidable sources of disease and what they could be made to do. This public interest once having been awakened in regard to vital statistics in their connection with public health, it has not been allowed to die out in Massachusetts. Their returns have become more complete, accurate and universal and present a much nearer approximation to accuracy than those of any other State. The past history of disease and its present history as shown by statistical returns prove that some epidemic diseases have ceased upon the surrender of the habits of life and the avoidance of the causes which gave rise to them, that others have been diminished in their frequency and their severity, and that the average duration of life in civilized communities has greatly increased. Dr. Richardson states, on the authority of Heberden, that in England from 1790 to 1810 the general mortality had diminished one-fourth. He quotes from the French statistics that in 1780 out of 100 new-born infants 50 died the first two years. From 1817 to 1827, only 38 of the same age died, an increase of infant life of 25 per cent. The black death, the sweating sickness, the plague, Devonshire colic, jail fever and other scourges, which once prevailed, have ceased their ravages; and small-pox, once the most terrible and fatal of diseases, has almost ceased to destroy and to deform. For the triumphs of enlightened observation, based upon the statistical or numerical method, the world is indebted, especially to Sir George Baker in regard to the lead poisoning of Devonshire, to Howard for the disappearance of jail distemper and the black assizes, to Capt. Cook for the mode of prevention of scurvy among seamen, and to Jenner for the immortal discovery of vaccination. Statistical records for a series of years in Massachusetts, led Dr. Bowditch to a recognition of the causal association of consumption, the great source of mortality in this climate, with conditions of soil moisture; and the same method led Dr. Buchanan, in England, independently of any knowledge of Dr. Bowditch's researches, to reach the same conclusion in regard to residence upon a wet, undrained soil being a cause of consumption. The transmission of cholera by means of drinking-water, as proved by Dr. Snow, and the propaga-

tion of typhoid fever in the same way, are instances of the triumphs of the statistical method in the progress of sanitary reform. For the successful use of the numerical method statistics should be accurate, for, if they are not so, they are misleading and afford no ground for reliable comparison.

"In New Jersey the old law for vital statistics is practically a continuation of a law enacted in the last century or a compound of two such laws. One of these provided for a registration of marriages in the office of County Clerk, and the other recognized the importance of a registry of births and deaths as affording evidence of legitimacy and furnishing a means of tracing descent. It provided that the Township Clerk should keep a registry of any birth or death reported to him. It was merely a continuation of the old English parochial registry. The act of 1848 and its supplements consolidate these two enactments and gives the Secretary of State supervisory power of these returns, authorizing him to issue blanks and instructions and to prepare from the returns a tabular statement. The result is that for more than twenty-five years annual volumes of statistics have been published by authority of the Legislature, and a vast amount of money has been expended in gathering, arranging, tabulating and circulating such annuals, which have no practical value and are hopelessly misleading for any statistical comparison. The numerical traits not being faithfully gathered, the aggregate results are hopelessly confusing. Many townships made no returns, in others they are incomplete; nearly half the causes of deaths are unrecorded. In a very large number they are not given in the returns, and they are stated in the reports in such a way and upon such a system of nomenclature as would astonish any one who had not his attention called to these records."

At the meeting of the association in 1877 a committee again reported upon the subject. It had been asked to treat of three points, viz.: The history of legislation in New Jersey on the subject of vital statistics; a presentation of the methods of obtaining these statistics elsewhere; suggestions of improvements desirable or obtainable in the registration of these statistics in New Jersey. The following is the historical account thus given:

"From the earliest printed volume of the laws of New Jersey, the volume of Leaming and Spicer, it appears that at the session of the Legislature of East New Jersey at Elizabethtown in the year 1675, more than two hundred years ago, it was enacted that the Clerk of each town within the province should record in a book provided by the town, all births, marriages and deaths within the compass of the aforesaid towns, and to have for his care and pains three pence a name. This enactment was made less than a hundred years after the earliest

registration of vital statistics in England; for the parish records date back no earlier than the time of Queen Elizabeth, and the London bills of mortality only appear at the time of the plague in the 17th century. The great plague in London in 1665 is said to have killed 80,000 people and to have continued its harvest of death into the year of that work of destruction and sanitation, the great fire of London in 1666. These events are only a few years earlier than the legislation in New Jersey intended to secure a registry of births, marriages and deaths. The legislation of West New Jersey was a little later, but in 1682 an act was passed providing for a public register of marriages, births and deaths in that province. The earliest legislation in New Jersey and its earliest volume of laws recognized the importance of a record of the facts of the social history of her people, and in some of the published letters of instruction to the Governors of the provinces orders are given that the names of those born, married or deceased in the provinces shall yearly be transmitted to the city of London.

"After the Revolution and the attainment of the independence of this colony from Great Britain, an act was passed in 1790 for the registry and proof of marriages, births and deaths, when required. A law in regard to marriages was passed in 1795 and an act for the register of births and deaths when required in 1799.

"The act of 1795 concerning marriages makes up the first eleven sections of our present act concerning marriages, births and deaths, and the act of 1799 for a register of births and deaths reappears in the sections from the 13th to the 20th inclusive of the same law. The 12th section of the law passed in 1848 provided that the Secretary of State shall have general supervision of the registry of marriages, births and deaths in the State; that the records obtained by the clerks and assessors of the townships and cities of the State shall be returned to his office, and that he shall prepare from these returns such tabular results as will render them of practical utility. These returns are by the law directed to be made once a year. The assessor is entitled to ten cents for each marriage, birth and death obtained by him, and the clerk of the township to a like sum for making return to the office of Secretary of State. The history of legislation in New Jersey in regard to vital statistics shows that no real progress has been made in two hundred years, and that although the instructions issued by the Secretary of State truly declare that the value of these statistics collected at great expense depends almost entirely on their *accuracy*, their *completeness* and their *universality*, it appears from the annual printed volume that the returns were made without regard to accuracy or system; that they were made in less than fifty per cent. of the cases, and that in many of the townships the law is entirely disregarded. Accuracy, completeness and universality cannot be said to characterize the registry and return and tabular digest of vital statistics in New Jersey as made before the law of 1878.

"The second point of this report involves a discussion of methods adopted in other States for securing the facts of the vital history of their people.

"In the year 1836 the English parochial registry of births, marriages and deaths not proving satisfactory, a general registration law was enacted in England. The law went into operation in 1837. An act evidently worded after the English law was passed in Massachusetts in 1842. Our law was enacted in 1848 as a result of the legislation in Massachusetts, and probably because the Secretary of State at that time, Dr. McChesney, was a member of the medical profession. The act of the State of Michigan was passed in 1867. It has seemed best to the committee to refer only to the registry in England and in the States of Massachusetts and Michigan in this country.

"The registry in England from its commencement 40 years ago has been under the supervision of Dr. Wm. Farr. Dr. Guy in discussing the origin and progress of sanitary reform in England thus speaks of the English registry: 'But happily we are not equally destitute of facts, for the Registrar-General had been for some time at work, heaping up materials to serve as the bricks and hewn stones of a scientific edifice, and furnishing periodical returns which had a direct practical value both through the interest they created and sustained and the wholesome warnings they administered.'

"The English registry is a continuous one. Parents are required to record births and the nearest relatives deaths in the civil register books under penalty. The last Report of the Registrar-General states that very few deaths escape registration and that the registry of births is becoming more complete. Marriages are necessarily recorded as they are performed only upon license granted. The registry is based upon parish and town organizations, and the returns are made to the Registrar-General in London. In the last report of the Massachusetts State Board of Health, in a paper on registration of deaths, it is said that 'to such a high degree of perfection has registration of deaths now arrived in England, that on each Tuesday a printed pamphlet of ten pages is prepared and sent over the kingdom, giving the cause of deaths, etc., with the conclusions and warnings to be drawn from them for the week ending the previous Saturday and collected from twenty-three towns, containing over eight millions of inhabitants. Of course even these statistics are open to fallacious and misleading conclusions, for all the assigned causes of death do not represent the same diagnostic skill; the average age of the inhabitants of a district will feebly influence its death-rate, and a reputation for salubrity in a place may attract weak and feeble persons to that locality; but these are disturbing influences which had to be eliminated by large numbers and by the gradual advancement of knowledge. Statistical knowledge is not more exact and conclusions from statistics not less susceptible to error than are the facts and influences of other sciences.'

"In Michigan the returns of vital statistics made to the Secretary

of State's office are edited by the Secretary of the State Board of Health, and the system in Michigan, while claimed by Dr. Baker, the Secretary of the Board of Health, to be 'one of the best in actual operation on a large area in the United States,' is by no means what he wishes it to be. He insists the great 'difficulty in the way of obtaining reliable vital statistics is a lack of appreciation of the importance of the subject by the people.'

"The third point assigned to the committee, was suggestions of improvements desirable or attainable in the registration of vital statistics in New Jersey. In a report made to the New Jersey State Medical Society in 1869, the chairman of your committee was at that time of opinion that no modifications were practicable in our system, and he is not sure that eight years has witnessed so great an improvement in knowledge in this State that wise and efficient, and at the some time costly, legislation on this subject can be secured. The collection of accurate, full and trustworthy statistics and their intelligent analysis is necessarily costly work. An efficient health organization in every township and city in the State, with the executive officer of the organization a local registrar of vital statistics, and the supervision of these statistics by the State Board of Health would be desirable reforms, but not attainable from a legislature which represents a constituency unenlightened upon the importance of health questions, and the dependence of these questions on statistical records. The acceptance of a return of causes of death only from registered and competent physicians would be a desirable reform, but not attainable as long as so large a number of the people adhere to charlatans and pretenders in medicine. Your committee believe that improvement in our system of vital statistics can only be progressive, and as possible steps in the line of progress they would suggest a closer association of the work of securing vital statistics with the organization of the New Jersey State Board of Health, and that proper blanks be furnished to the assessors and town clerks to facilitate the procurement of these records. Blanks will be filled up when the information otherwise would not be obtained. Your committee is also of the opinion that increased compensation to assessors and town clerks would secure better returns. The State cannot secure labor without compensation any more than individuals can. They would suggest that compensation be made only for complete and satisfactory returns.

"The importance of health legislation, and its dependence upon accurate and trustworthy statistical records, has been abundantly recognized. Mr. Disraeli, now the Earl of Beaconsfield, in an address delivered in London a few months ago, says:

"'The health of the people is really the foundation upon which all their happiness and all their power as a State depend. It is quite possible for a kingdom to be inhabited by an able and active population. You may have skillful manufacturers; you may have a pro-

ductive agriculture, the arts may flourish, architecture may cover your land with palaces and temples, you may have borne material power to defend and support all these acquisitions; you may have arms of precision and fleets of fish torpedoes, but if the population of that country is stationary or yearly diminishes, that country is ultimately doomed.'

"The last Legislature of New Jersey, by the organization of a State Board of Health, has placed it in the power of that Board to educate public sentiment upon questions of health, and to carry on with greater efficiency the work for which this Association was primarily organized. When public sentiment becomes enlightened upon the importance of the subject, wise and efficient legislation will be had, and accurate, complete and full statistical records of the vital movements of her people will be had in the State of New Jersey."

This enlightened legislation has already been had to the extent of securing returns and records which will favorably compare with those of any other State in the Union. While provision has not been made for all the varieties of tabulation, which many statisticians regard as important, we are able to secure those which are at the basis of all the rest. Cities, by the facilities afforded, can, with but little additional expense, have such weekly records of the precise locality of cases of death and sickness as will greatly aid in directing Boards of Health to those localities in which nuisances are producing the most serious results.

The law operates well where city clerks and assessors keep an accurate list of those who should furnish returns, and see to it that those who are slow are reminded of their duty. The local Boards of Health can also coöperate with great advantage. As these records are constantly available to decide questions of property, of pension, of age, of life insurance, of right to vote, etc., parents and friends cannot be too particular in claiming the right of record. Clergymen, physicians and others need to remember that a single neglect may at some future time be the occasion for censure and for fines and penalties. The law is as facile as such a law can be, the books and blanks now furnished are compact and the system works well in the hands of those accustomed to system and punctuality. It is pleasant to know that many of our physicians now study the records with great interest and profit. The returns of births are incomplete, especially in cities, although, for purposes of comparison with marriages and deaths, full approximate calculations can be made.

DEATH-RATES.

The study of death-rates furnishes a very important mode of determining the health conditions of population. Nevertheless, the modes of study must be well understood and hasty inferences must not be made. Here are some of the limiting factors which must enter into the account:

I. There must be a sufficient population to enable us to eliminate the errors to which generalizations made from small data are always liable. If two persons are taken sick with a disease and one dies, it is not safe to make an average and say that the usual mortality of that disease is fifty per cent. If, on the other hand, 10,000 persons are taken sick with a disease and one-half die, there is much greater probability that fifty per cent. expresses the average mortality of the disease. This is greatly strengthened if the same mortality has occurred in different years and in different localities. If, for instance, measles, in twenty different years, and in twenty different localities, and among a population of 20,000 people, showed this mortality, the deduction would be very safe that this was the average prevailing mortality of the disease. The law of probabilities, as it is called, becomes in such a case a very accurate law, just because of the number of the events compared, whereas, the same proportion of fifty per cent. of deaths in two cases of the disease, although mathematically correct, is worth nothing as an inference in reference to the general mortality of the disease. The illustration, therefore, adds two more considerations to our first, viz.:

II. The calculation must include a large number of cases; and

III. It must extend over a sufficient length of time. To this is now to be added a fourth.

IV. It must include some specification as to the character of the population affected. A death-rate among a community made up wholly of men, or wholly of women, or wholly of children, or in which the proportion of either materially differed from the generally ascertained proportion, would have its significance also varied. It is for this reason that birth-rate must be considered, for we must know the material with which sickness or death have to deal, if we would make comparisons and inferences.

V. Added to this must come in also a consideration of locality. This first inquires whether in city or country, since the density of

population is a most intimate factor in relation to disease. Nor is it enough to find out that one is a rural population and another a city population, since parts of the same city differ so much. There are country localities exceedingly prejudicial to health, just as there are city localities and conveniences that may even place parts of a city superior for health to the average country prospect. Besides this, three are four other incidental and modifying facts come into view. If a city is emptied of one-half of its inhabitants for four of five of the summer months, the average death-rate on the basis of its whole population does not give the correct idea. To some extent nationality, length of residence, and, still more, the occupation, modify the significance of the death-rate.

While a yearly statement of death-rates is valuable, all these facts go to show that hasty inferences will not do. Hence the facts furnished in the quinquennial tables of last year are far more important than the statement for any one year. Hence, also, every city is untrue to itself that, instead of repeating tables better kept by the State, does not expend its work in a record of death and causes of death in every house. So a city, say after five or ten years, is able to know precisely its death-dealing and sickness-producing localities. If there is only *accuracy*, it is wonderful how, ere long, the vital statistician can come to know the significance of data, how to eliminate disturbing facts, how to balance them, and so how to reason upon his statistics. The very act, too, of collecting the data is valuable as leading to close habits of observation, as to the welfare of population. As sickness and the losses by sickness, not only of those that die, but of those that recover or partially so, has a definite proportion to the death-rate, it is to be remembered that every death stands not only for industrial loss, according to the data of age in the person, but also to others who have been sick or those whose time has been occupied in care, so that a sickly household, and more significantly a sickly city or county, has a limitation on its progress and a limitation on its existence more definite and more implacable and a burden more intense than can be put upon it by any other force in the whole range of destructiveness.

So wisely and well did the Jews understand this that in their best nationality their most accurate accounts were kept with the population, and the political problems most studied were those having reference to its care. And amid all their misfortunes this attention to vital

conditions remains as their best heredity. So much so, that with all their enforced disabilities, their vitality is their greatest possession. Their death-rate in cities and in epidemics is much below that of surrounding races, and their pauperism and their crime seldom a burden upon the nations amid which they dwell.

Nearer at home and more recent is the history of the "Society of Friends," which has always kept its most accurate credit and debit account with its people, counting these as a possession and a glory, making accurate record of every vital event, having the community or society, as well as the family, look after each individual. They thus show a hardiness and thrift of stock, of health, of character, of industry and prosperity such as should teach our State what are the demonstrated possibilities, and if we would adopt their plan of population-care and in every respect husband life and health as not mere favors but as things to be secured on a plan for the blessing, prosperity and perpetuity of the State.

Again, in the study of death-rates as one of the indices by which we judge of sanitary conditions, there is need not to rely so much upon totals as upon other comparisons. Taking this as the start, it is usual next to find the death-rate from that class of diseases known as zymotic or filth diseases, and which depend much, either for their inception or fatality, upon local conditions. The percentage of deaths of children under five years of age, as also of those under one year of age, form other classes for comparison. It is by the study and comparisons of each of these for sufficient periods, and with sufficient numbers, that greatly aid us in detecting causes of family, local or personal disease. The best English authorities claim that the yearly zymotic death-rate in healthy districts ought not to exceed one to two per thousand, that the whole number of deaths out of every 1,000 births should not exceed 100, and of 1,000 under five years of age not over 175. The moment we come to compare the healthiest localities in healthy country districts we see the great increase caused by artificial conditions. If in England and Wales the general mortality were that of the healthiest districts rating them, as with a death-rate of seventeen per one thousand, it would be equivalent to an annual saving of 115,000 lives.

If for the last five years the death-rate of all New Jersey had been that of Cape May county, there would have been an annual saving of over 6,000 lives. The veteran sanitarian of Great Britain, Mr.

Edwin Chadwick, in his address at Aberdeen, in 1877, thus summed up the results shown by the statistics and experience of his own country:

1. We have gained the power of reducing the sickness and death-rate in most old cities by at least one-third.

2. In new localities, with healthy dwellings, properly constructed drainage and a pure water-supply, we may reasonably look forward to insuring a death-rate of only 10 per 1,000, or less than one-half of the present average death-rate.

3. That in well-provided and well-regulated institutions for children and in prisons and other places under effective sanitary control, the death-rate is not only enormously reduced when compared with that of the general population of the same ages, but a practical immunity can be secured against zymotic diseases.

4. That amongst the general population a reduction by full one-half of diseases of the lungs may be effected by general public sanitation.

THE STATE CENSUS OF 1885,

AS BEARING UPON VITAL AND SOCIAL QUESTIONS.

The relation of vital statistics to other tables as to population, is such that whenever any enumeration of the people is taken, it becomes the duty of this bureau to examine it in those respects in which it reveals the vital and social status of the people. In the taking of the semi-decennial census of this State, there was need of a consideration of the general law of Congress, which had certain provisions relating to a State census, as also of the acknowledged defects of all previous methods of securing a State census in this State. The Department of State early took the matter in consideration and called into consultation those whose duties made them familiar with studies and methods relating thereto. It was soon found impracticable to attempt to avail ourselves of any Congressional provision, since it was conditioned on the securement of a great variety of schedules and would involve a State expense far beyond that which any one felt to be needed. On the other hand, it was important to avoid the confusion into which the former State census had fallen, and to secure such data as not only would give us the fact of increase or decrease, but also acquaint us with the nationality of the people and their social condition, as revealed by the size and housing of families.

It is believed that the present census has singled out the items most important to be secured in a semi-decennial enumeration of the people, and that it has secured with an accuracy never before attained, the items of information which it has attempted to secure. These are names of persons, their sex, nationality and color, the number of families they represent, the number of families in each house, and the periods of age in which they are distributed.

The ages have been secured in divisions to conform to those used in the vital statistic tables. Although for some purposes it is desirable to know how many are represented in every year, or in every quinquennial period of life, yet the present division will be found avail-

able in most comparisons. Those five years of age and under include the age of infancy or entire dependency. From 5 to 20 embraces as near as may be the *school period* or preparation period of life, one in which comparatively few are self-supporting, but, nevertheless, one in which among the laboring population it has been shown that many, if in good health and of industrious habits, are, as a rule, no expense to their parents. It is the period for school and trade, or business education. From 20 to 60 gives the working or productive period of life in which the average individual should be able to contribute to his own support, and that of the State. Indeed, it is a poor system of social organization or of personal management, if this period does not tend so to preserve health and to exercise working power, physical or mental, as would not only be self-supporting, but to do something toward the support of the declining and less operative years of human life. While over 60 covers a wide range of age, it practically represents a period in which the majority do not make a full livelihood, and are able to contribute but little to the general increase or prosperity. So far as births are concerned, the number being under five years of age is generally found to be about equal to the number who have born and died under that age. Comparisons of these in their respective localities enable us to correct some defects of report in the birth-rate as well as to compare the birth-rate of cities and country, and see where the causes which destroy the infant population are most operative. It would have been still better to have ascertained the number living under one year of age, and to have added these to the number dying under one year, but the increase of columns did not seem to be desirable.

While it would have been desirable to know how many were actually living in married life, it was believed that the now quite complete marriage records of the State and the numbering of the *families* would acquaint us with the actual facts better than the statement as to each person, whether he or she was married or single. No one can go over any census without suggesting some facts it would have been interesting to secure, but as each additional column adds much to the work, a careful limitation has to be exercised and a selection made.

Much light is thrown upon the social condition of the people by a comparison of the number of dwellings with the number of families. In fact, a comparison of the two columns will generally show not only how many families but how many persons live in one house, while a continuation of the analysis reveals their approximate ages.

That is the best state of society in which a large proportion of the population is represented by families located in separate houses.

These few selected series of facts, as obtained in this census, admit of comparisons and deductions far more interesting and informatory than at first sight appears. The compilation and presentation of all these would require much more clerical force and expert study than has been provided for in the act authorizing the enumeration. But we call the attention of all statisticians, and all those interested in social and economic studies, to the facts that are secured in this enumeration.

Had the census come into our possession earlier or in printed from, it was our intention to follow out some of these studies more fully than can be done in so brief a period.

As it is, we shall, from time to time, be able to profit by comparisons, especially as they concern the death-rates of the various cities and country districts.

While the proportion of deaths to the living population in any given locality is informatory, it is only when we come to study more closely the material as to age, etc., with which disease has had to deal, that we arrive at a more important estimate of its significance.

A death-rate of 30 per 1,000, among the population between the ages of 20 and 60, for instance, would be far more significant of some special visitation of mortal disease than the same death-rate among the same number under five years of age. On the other hand, as it is an ascertained fact that the preventable or induced diseases, and especially those known as communicable, affect the young population more than the adult, a large ratio of such deaths among the young often points to local causes of disease which are especially operative and can be restricted.

In an article on the census of 1880, to be found in the fourth report of this Board, we instituted a series of comparisons as to population as represented in the State as a whole, at different periods, and then by townships and by cities.

By the corrected figures of the census office, and by the figures of the later semi-decennial census, the record is as follows:

Entire population of the State, 1860	672,035
Entire population of the State, 1870	906,096
Entire population of the State, 1880	1,131,116
Entire population of the State, 1885	1,278,033

Additional particulars as to native and foreign population are as follows:

	1860.	1870.	1880.	1885.*
Native population	549,245	717,153	909,416	1,027,687
Foreign population	122,790	188,943	221,700	250,346

By the census of 1880, and that of 1885, the distribution of sexes is as follows:

	1880.	1885.
Native white males	429,064	487,891
Native white females	441,633	497,955
Foreign-born white males	111,806	126,907
Foreign-born white females	109,514	123,439
Colored males	19,052	20,388
Colored females	20,047	21,453

From the present census it appears that there are 210,267 occupied houses in the State of New Jersey, and that there are 267,294 families.† In cities of over 5,000 inhabitants, there are 146,238 families and 99,215 houses. Local Boards in each township, and especially in each city, can trace for themselves the relation of houses to population. As a rule, rented houses or houses in which there are more than two families need to be looked to as to their sanitary condition more than those which are occupied by the owners. This is especially true of the class known as tenement-houses.

An undertaker, who owned and rented a large number of these, was once asked whether the rentals paid. His answer was "No, but the funerals do." This undertaker lived on the other side of the Atlantic.

As in the fourth report (1880), we here give a list of cities, towns and boroughs, or other forms of incorporated government, with corrections afforded by the present census. This is the more important because sickness bears so much relation to density of population, and because the law now requires that every city, town or borough of over 2,000 inhabitants shall have a Health Inspector. It also allows the State Board to require the appointment of a township Health Inspector by the local Health Board where, on account of density of population or other obvious reasons, such appointment is needed.

There are a few townships in which are close populations in towns, but which have not been incorporated as such. Such places as Bound

*Of the native population of 1885, 41,841 are colored.

†The return for Ocean county in this respect was imperfect, and houses are supplied on the basis of five to a family.

Brook, Somerville, Mount Holly, etc., are examples of these, although they have no other form of government than that of the townships of which they form a part. The recent law which permits the State Board to direct the local Board to have an inspector for townships, when needed, will aid in securing the general health of townships in which such villages are located.

If the local Boards will look carefully after the death-rates and the general vital and social conditions of such localities, they will find many facts bearing on the care of population and the prevention of disease. The census for each township, city, county, etc., will be found with the tables of death-rates, and can there be referred to. For fuller details we refer to the report of the census, when printed, but desire thus to lead all persons in their various localities, and especially the Health Boards in oversight of cities, to study closely the relations of age, sex, nationality, social relations, number of families and number of dwellings to the vital conditions of the population.

FACTS AS TO CITIES OF OVER 2,000 INHABITANTS.

	Dwellings.	Families.	Total number of inhabitants.
Over One Hundred Thousand.			
*Jersey City, Hudson county (city)	16,114	30,707	153,513
*Newark, Essex county (city)	19,467	34,496	152,988
Between Seventy and One Hundred Thousand.			
No city	....	....	....
Between Fifty and Seventy-five Thousand.			
Paterson, Passaic county (city)	8,686	13,105	63,273
Camden, Camden county (city)	10,524	10,852	52,884
Between Twenty-five and Fifty Thousand.			
Hoboken, Hudson county (city)	2,601	7,928	37,721
†Trenton, Mercer county (city)	6,546	6,893	34,386
Elizabeth, Union county (city)	4,960	6,404	32,119
Between Fifteen and Twenty-five Thousand.			
New Brunswick, Middlesex county (city)	2,732	3,682	18,258
Orange, Essex county (city)	2,177	2,904	15,231
Between Ten and Fifteen Thousand.			
Bayonne, Hudson county (city)	1,779	2,413	13,080
Bridgeton, Cumberland county (city)	2,093	2,273	10,065
Between Five and Ten Thousand.			
Plainfield, Union county (city) (North Plainfield 3,728 additional)	1,474	1,975	8,913
Millville, Cumberland county (city)	1,801	1,866	8,824
‡Morristown, Morris county (city)	1,308	1,600	8,760
Chambersburg, Mercer county (borough)	1,715	1,775	8,542
Town of Union, Hudson county (town)	1,225	1,683	8,398
Passaic City, Passaic county (city)	1,087	1,621	8,326
Phillipsburg, Warren county (city)	1,690	1,712	8,058
Atlantic City, Atlantic county (city)	1,725	1,753	7,942
Rahway, Union county (city)	1,345	1,518	6,861
Harrison, Hudson county (city)	1,003	1,335	6,806
Burlington, Burlington county (city)	1,583	1,613	6,653
Perth Amboy, Middlesex county (city)	921	1,326	6,311
Gloucester City, Camden county (city)	1,137	1,147	5,966
Salem City, Salem county (city)	1,293	1,291	5,616
Long Branch Village, Monmouth county (town gov. by commission)	1,015	1,154	5,140
§Cities, Towns, Etc., Between Two and Five Thousand.			
‡Hackensack, Bergen county (town governed by commission)	859	1,016	4,988
Bordentown, Burlington county (city)	1,211	1,212	4,683
‡Princeton, Mercer county (borough)	883	935	4,577
Lambertville, Hunterdon county (city)	969	973	4,067
Somerville, Somerset county	621	748	3,316
Woodbury, Gloucester county (town)	712	727	3,278
Red Bank, Monmouth county (board of commissioners)	578	676	3,186
Vineland, Cumberland county	684	805	3,170
Dover, Morris county (town)	527	667	3,170
Keyport, Monmouth county	612	727	3,063
‡Newton, Sussex county	511	610	2,648
Hackettstown, Warren county	479	578	2,645
Washington, Warren county (borough)	556	578	2,597
‡Hammonton Atlantic county	488	518	2,525
Boonton, Morris county	470	540	2,390
Asbury Park, Monmouth county (commission)	502	521	2,124
Freehold, Monmouth county (town governed by commission)	405	421	2,124

* Hoboken is so much a part of Jersey City that its close proximity must be borne in mind in all Vital Study. The same is partly true of some of the suburbs of Newark.

† In reference to Trenton, it is also to be remembered that Chambersburg joins it closely with 8,542 inhabitants.

‡ Includes township.

§ All of these cities, etc., are now required by law to have Health Inspectors.

THE CLIMATE OF NEW JERSEY.

THE RELATION OF CLIMATE TO CONSUMPTION AND OTHER LUNG DISEASES.

BY MISS E. FOSTER, NEWTON, N. J.

The climate of this State may be described as having special features. Beside the general climate caused by the latitude, there are variations of this which may be classed as sea climate, land climate, and a climate as varied by relations of land and water.

The sea climate is equal, uniform, moist; the land climate is excessive, in its sharp contrasts, and dry.

The range between these is wonderful; and it is claimed for New Jersey, that while wanting in the harsher features so peculiar to the climate of New England and our Northwestern States, and possessing all the softness of a Southern clime without its disadvantages, yet there is every variety of temperature, of dryness, and of moisture which gives to climate those pleasing characteristics so essential to individual development.

The cause for the diverse character of the climate of the State may, in general, be due to its situation on the Atlantic slope of the continent, between the ocean and the high mountain ranges.

The geological structure and the nature of the surface, which bear so important relation in modifying the general character of the climate, need to be studied in order to discover the reason for marked local peculiarities.

In giving comparative results of the study of climatic conditions, the uniform observations made at different regional stations in this State, shall be the basis from which deductions are drawn. These studies date from July 1st, 1878, and cover a period of six years. The points at which meteorological observations have been made, fairly represent the natural geological and climatological divisions of the State.

The climate of the northern part of the State is greatly in contrast with the extreme southern portion. This is in correspondence with the elevation of the northern part, and the nearness of the southern portion to the sea. Still the contrast is not so much a difference of range of temperature as in the diverse character of the seasonal changes at the north. A comparison of the climate of places in the interior of the land, either north or south, with the climate of Cape May subjected to the influence of the ocean, will bring clearly out this difference of land and sea climate.

The appended table (page 375) gives in degrees Fahrenheit the mean annual and seasonal temperatures for the different climatic divisions of the State.

Comparing Newton with Cape May, the table exhibits the difference between the mean summer and winter temperature: At Newton, 40.85°; at Cape May, 34.42°. We see that the difference between these stations, 6.4°, is not so great as the difference in latitude would lead us to expect. It is almost wholly one of winter temperature.

Next taking Vineland, in the pine-land belt, representing the climate of the southern interior, we find the difference between mean summer and winter temperatures to be 41°. Compared with Cape May it shows a difference of 6.5°. The mean temperature at Vineland is higher in summer. That of the autumn and winter is much lower than at Cape May, but not so low as compared with like seasons in the northern half of the State.

Not to multiply comparisons, we find the northern and southern interior portions of the State to possess a continental climate; that of the Kittatinny Valley and the Highlands not marked by excessive extremes of temperature, the annual range at Newton, for the series of years within our observation, running from 91° to 102.9°; while the range of temperature for the year at New Brunswick varies from 93° to 106°, and that of Vineland from 87° to 108.5°.

The average length of the period between the greatest cold and the greatest heat is seven months. In some years the minimum temperature was recorded in February, and the maximum in September, thus prolonging the hot season eight months. At the inland stations the monthly ranges from June to September are low. The very hot periods are not long continued, and the mean minima are low enough to give cool nights. The winter months have wide ranges, due to extremes in both directions from the mean temperature. Still the climate is not considered excessive.

The table (page 375) exhibits the gradual changes in the mean temperature of the seasons, and of the year, as we go from north towards the south. The slight increase of cold in the winter from Newton to Freehold, the equable warmth of summer and autumn, and the changeable spring, point to some local influences. Newton and Freehold are more nearly alike in mean temperature and in seasonal changes. The fact that Newton, representing the northern boundary of the State, should show a higher mean summer temperature than is observed at Freehold and New Brunswick, would seem to find its explanation in its situation near the mountain ranges and in the prevailing southwest winds. By reference to the charts issued by the United States War Department, showing the isothermal lines of the United States, it will be seen that, during the months of May, June, and part of July, the same isotherm passes through Barnegat, New York and Newton; from thence, taking a southwesterly course, it follows the Allegheny range from the 41st to the 35th parallel, touching the northern border line of Georgia, and, by a very circuitous route, reaching San Diego, on the Pacific coast, situated on the 33d parallel.

The observations at Newark and Paterson show very little difference in the mean seasonal temperatures between Passaic Valley and the southeastern portion of the red sandstone plain. At Paterson, the mean range of temperature is wider than at Newark, but the extremes of temperature are not so great in the warm and cold seasons as at Newark. Newark shows the influence of tide-water. It has a land climate greatly modified by its nearness to the sea. This is shown in its most equable daily range. While in winter lower temperatures are sometimes recorded than in the Kittatinny Valley, to the northeast the cold season is short, the spring opens early and advances rapidly. The record, not only for the series under consideration, but for the whole term of forty-two years since 1843, exhibits an equability of range, both barometrical and thermometrical, not exceeded by any other than the coast stations.

It is to be regretted that the data are not at hand for comparing the mean of the *daily* range at all of the stations. This would be more informatory as to the equability of temperature, and all future tables should include it.

The stations bordering the ocean are the ones clearly marked as having the uniformity of a sea climate. The coast from Sandy Hook to Cape May is directly exposed to the ameliorating influence of the

ocean's waters. The effect of this is to temper the extremes of heat and cold, to reduce the range and mean temperature of the warm months, and to give greater evenness of humidity.

It is difficult to define the limits of this climatic province, as it merges into that of the southern interior on the west. The influence of the ocean's waters is felt to a distance of four to eight miles from the outer coast-line, the increase being from north to south.

The northern coast stations agree closely. In the warmer months the average temperature of Sandy Hook runs higher than Barnegat or Atlantic City. The average for the winter is very near 32°—that of the formation of ice. There is a marked difference in the winter season between Cape May and the other coast stations. The average daily minimum at the Cape runs higher from four to five degrees than at Barnegat and Atlantic City. The more southern situation of Cape May, together with the adjacent influence of the Delaware bay on the west, seems to offer an explanation of the peculiar features of its climate, which is of a more insular type than that of Atlantic City or Barnegat. For evenness of temperature and slight daily range, this station is the most remarkable one on our Atlantic coast. It is noteworthy that the mean of the maximum temperatures for six years is a fraction below 88°—the temperature of the sea.

The winter and spring of 1884–5, which were of exceptional severity, are not included in this series, the necessary data not being at hand. These figures might be altered somewhat by them, but their relations to each other would remain unchanged.

The variations in the mean barometer in the several parts of the State are inconsiderable. The pressure being so equally distributed, we are not sensible of any existing differences that may affect human organism. The highest pressure is usually recorded in February. The winter months have the widest range. June and August show the least fluctuation in the barometric column. Newton and Vineland record the same changes. Freehold and Newark show a steady level. At the coast stations the variations are reduced to a minimum.

RAIN-FALL.

The rain-fall is one of the measures of climate, and second only in importance to temperature. Our tables show great variations in the distribution of the rain-fall in the northern and central portions of

the State. There is an increasing rain-fall proceeding from north to south as far as New Brunswick. This station records the lowest average annual fall, amounting to 40.73 inches. Paterson, with the highest average annual fall of 59.28 inches, presents a phenomenal record. These two stations represent the extremes of excess and deficiency in the rain-fall of the State. Paterson records in 1880–1 the greatest annual fall, 83.48 inches, an excess of 24.20 inches over the mean, and this being followed by a drought in the months from July to September, during which time there were ninety-eight days on which no rain whatever fell. In 1879–80, New Brunswick recorded the lowest yearly fall, 29.33 inches. The record of the rain-fall at this place has been less than the average of former years. Newton, with an average annual fall of 42.02 inches, and Newark, 44.88 inches, have kept well up to their average.

In the southern half of the State the increasing rain-fall is observed from stations inland to those on the coast. This is more marked in the monthly falls than in the annual averages. The excessive monthly falls of the inland and coast stations occur in corresponding years. The rains at Freehold, Sandy Hook and Barnegat are equally distributed by months. Freehold has an average annual fall of 48.95 inches; Sandy Hook, 50.51 inches; and Barnegat, 51.32 inches. Freehold seems to be exceptional in the number of thunder storms by which it is visited. Though Vineland and Cape May are in close correspondence as to the monthly and yearly averages, yet in most of the seasons the interior station has received the greater amount of rain-fall. The average annual fall at Vineland is 50.60 inches; that of Cape May, 49.48 inches. As the number of days on which rain fell is one-third less at Vineland than at Cape May, it follows that the precipitation in any given storm at Vineland must be greater than at Cape May. Vineland appears to get more rain all through the year than any of the other stations in the southern interior. This is probably owing to the presence of water to the west and southwest, and to the direction of the wind, which has an intimate connection with the rain-fall.

The autumn and winter rains of Cape May are generally less than at any of the coast or southern inland stations.

The rain-fall at Paterson is phenomenal and peculiar to that locality. It is not wholly limited to the storms of the warmer months. The extraordinary rain of March, 1881, amounted to 16.11 inches,

5.44 inches of which fell in eleven hours. The memorable freshet of September, 1882, which extended throughout the State, in Paterson resulted in a rain-fall of 18 inches in less than three days, and giving a monthly fall of 25.98 inches, the largest monthly amount in our records.

"The situation of Paterson in the depression of the first mountain range, where the Passaic Valley finds its outlet across the trap rock barriers to the open country, no doubt contributes to produce the greater rain-fall." (N. J. Geological Report, 1881).

John T. Hilton, a former observer at Paterson, says that the summer storms appear to move from Paterson northeastward along the southeast of the Highlands to the Hudson, at Peekskill. It is quite probable that the saturated air as it moves northward is more suddenly cooled by the forest-covered Highlands, and its moisture is thrown down along the border land of the red sandstone plain adjacent to the Highlands.

An Indian tradition is, that the storms divide over the summit of Snake Hill, going north and south twenty-five miles in each direction, the heavier portion going northeast by way of Paterson. This is from the lips of one of the old Hoboken Indians, and simply serves to show that the peculiarity of the Paterson rain-fall has been long in existence.

The total fall of snow is measured melted, and so is included as so much water or rain. The depth varies greatly from winter to winter. There is also a variation between localities in the same winter. The average depth measured at Newton is fifty-two inches, with a range between five feet seven inches in the winter of 1883–4, and two feet nine inches in that of 1878–9. In 1880–1 the total fall of snow at Newton was fifty and a half inches; at Freehold it amounted to seventy-nine and three-quarters inches. At the coast stations the snow melts rapidly and the sandy soil hastens its disappearance. In the northern part of the State it lies for a longer time and later in the spring. Some seasons there occurs a "thaw" in February; but when the cold season continues, the snow silently and gradually evaporates without adding chilliness to the air.

The average number of cloudy days in a year is less than one-third for the whole State, Freehold having the least number. For two hundred and sixty days out of every three hundred and sixty-five it is possible to enjoy fresh air and sunshine.

In general, our State may be considered as subjected to the same atmospheric changes, which are more or less modified by prevailing winds and natural conditions of surface.

The prevailing winds in New Jersey are from the west. In the northwestern part of the State, the winds take a southwesterly direction. In winter the northwest and southwest winds are about equally divided in frequency. At Newark and all the coast stations, the most frequent winds are from the northwest. At Vineland, from the southwest. The easterly winds are, in general, our rain-bearing winds. Our local showers and the storms of the summer months come from the west. The southeasterly winds, though at first gentle and soft at the inland stations, if continued longer than twelve hours bring moisture and a rawness to the atmosphere. The mean velocity of the northwest winds exceeds that of winds from the other quarters. The effect of this is to dry the air, thus lowering the percentage of relative humidity.

The humidity of a climate is the condition of the repose and restfulness of nature and man. The influence of great humidity upon temperature, and on the healthfulness of localities, is such that its determination is necessary to a full understanding of their climates. The effect upon temperature is to make it even. Moist climates are equable. The humidity of the air generally diminishes with the elevation above sea-level.

It is unfortunate that the observations for humidity are not complete at all of our stations, since variations are considerable within very short distances. At Newton, during the warmer seasons, and to a greater or less extent in the winter season, the amount of vapor present in the air is usually greatest about sunrise, from which time the amount decreases until sunset, after which it gradually increases until the next morning. At Philadelphia, the reverse of this is true, the time the amount of vapor is least being an hour before sunrise, the increase being through the day. We are not cognizant of any peculiarities of this kind on the east side of the Delaware river. If such exist, they should be carefully noted by individual observers as having important bearings on health.

The rapidity with which evaporation takes place depends greatly upon temperature, and the nature of the soil, whether hilly or marshy land, and its condition, whether cultivated or covered with forest growth.

The surface of the northern part of the State has a natural drainage toward the south. Some of the depressions between the hills are wet and swampy, but for the most part the soil is porous and dry. The red sandstone plain has a well-drained and naturally dry soil. In the Upper Passaic Valley there are extensive tracts of wet meadows and swamps, and some smaller areas of wet lands in Union county.

The trap-rock soils are all cold and generally wet, even when cleared and cultivated. That portion of the State which is drained by the Raritan has a quick-drying shale and sandstone soil. A large area, being almost entirely destitute of forest, the soils allow of an accumulation of heat in them. The surface of the southern half of the State may be said to be generally sandy, and the soils are warm. The poverty of the soils in the pine-lands is an evidence of the dryness of the climate. The influence of so sandy a surface is greatest in the southern interior.

To the table showing the relative humidity is added another, giving the absolute moisture, or the number of grains of vapor to the cubic foot of air. Using the saturated condition of the air as the standard of comparison (100), the relative quantity of moisture is expressed by percentage. The drier the air the lower the percentage, and conversely.

MEAN RELATIVE AND ABSOLUTE HUMIDITY.

	Relative humidity.	Grains of vapor.
Newton	68.86	2.91
Newark	72.74	3.16
Freehold	76.80	3.20
Vineland	69.13	3.15
Sandy Hook	73 62	3.28
Barnegat	77.95	4.17
Cape May	77.09	3.71

In winter, the absolute moisture at the north is reduced to a minimum; farther south it is less than one-half of the average for the year. In the interior, the months of July to November are the moist ones. At the coast stations, the four months of June to September are the more humid months.

THE RELATION OF CLIMATE TO CONSUMPTION AND OTHER LUNG DISEASES.

We have seen that "climate is itself modified by local conditions, and its effects upon us personally admit of being modified both by our mode of dealing with ourselves and our surroundings."

The prevalence of consumption is a well-attested fact. It has been shown by Dr. H. I. Bowditch, of Boston, that it is prevalent in damp soils in the United States. It is also common in countries liable to damp fogs. The prevalence of the disease is less in climates either uniformly warm and dry or uniformly cold and dry. Equally well known is the belief in climate as a cure for the disease. When for five years one-seventh of the deaths in the State have been caused by consumption, and a larger proportion in cities, and among the adult population, we are impelled to search for the causes at work in its production. If it should be found to be the outcome of any of the features of our climate, it would be folly to sit viewing with complacency the danger to which all are alike exposed. That we are in no way responsible for these conditions need not relieve us from making the effort to change them.

The study of this subject results in the conviction that there is no climatical reason *beyond human control*, why even our most populous cities should not be among the most healthful in this respect. Nature is on the side of health, and welcomes any curative influence.

In some portions of our northern counties where the surface drainage is natural and easy, the excavations for buildings are frequently made without reference to the level of ground-water. The ill effects are observed in the spring season, in the flooding of cellars and basements, giving rise to conditions detrimental to the health of the occupants of such buildings. There are cold, wet soils in our State. There is a string of swamps from one end to the other of the principal railway from Jersey City to Camden. The tide-marshes contribute somewhat to city dampness; but upon neither tide-marsh nor fog should be shifted the blame for man's neglect, which becomes criminal from being willful or ignorant. The mean temperature of certain parts of England has been perceptibly increased since the general introduction of draining marshy soils as a system of agriculture. Private enterprise in our own State has shown the possibility of removing these breeding spots of disease. Many imagine that consumption is a purely constitutional disorder, but it is now well recognized that it may be induced by overcrowding and bad ventilation, and may even become infectious under such conditions.

We have within our State certain well-recognized climatic conditions known to be favorable to the prevention and cure of consumption. What is really required is a cool, temperate climate, free from great alterations of temperature.

Our whole Atlantic seaboard, from Sandy Hook to Cape May, possesses unusual attractions of climate, especially beneficial to those suffering from pulmonary complaints. Mildness of climate, equability of temperature and recuperative properties of sea air, are found nowhere else in such pleasing combination.

This section represents a true mean between the winter rigors of the Colorado climate and the enervating and debilitating effects of the extreme south. Beyond the sea, farther inland, the vast waste of sand absorbs the atmospheric moisture and aids largely in drying and purifying the air.

Lakewood and Vineland promise to be invaluable as winter health resorts. We rely on facts deduced from years of careful observation, and upon medical testimony that cannot be controverted. It is noticeable that while during the winter and spring of 1884–5, the bay near Fortress Monroe was so filled with ice as to render Old Point Comfort a disagreeable resort, the winter cities of our own coast were delightful in their freedom from such discomfort.

The diversities of the climate of the northern part of the State afford many opportunities for that change of atmosphere which is so beneficial to the suffering. The dry winter climate of the extreme north has afforded great relief to persons afflicted with phthisis. Again, residents of the north have found the shorter winters of the central part of the State much less trying to their constitutions.

Pneumonia is so prevalent and fatal in some winters and parts of seasons as to have awakened public interest in the determination of the special conditions which cause this malady. It is of special importance to inquire whether it is due solely, or even principally, to the peculiarities of the season, or to the unwholesome condition of the atmosphere.

Scientists have endeavored to trace some connection between northwest winds and the mortality from this disease. This theory is not established. The severest gales on our high mountain ranges are from the north and west, while cases of pneumonia are rare. The "American Journal of the Medical Sciences" says:

"The relations of pneumonia to altitude are definite and marked; with increase in elevation above the level of the sea there is a steady diminution in the death-rate of pneumonia."

It has been noticed that while deaths from acute diseases of the lungs run up to high figures with every great fall of temperature,

the mortality is strikingly increased when fog or mist accompanies the sharp frosts. The cold and dampness act as an exciting cause, but these may be obviated by additional clothing and the more liberal use of fires.

Pneumonia is essentially a congestive disease, and the best preventive measures are those which avoid the causes of congestion. Overheated, ill-ventilated rooms, and the sudden transitions from these to the sharp outer air, are avoidable predisposing causes of the disease. Foulness of any sort depresses bodily vigor and renders the system more liable to attacks of acute lung diseases. Experience has proved that a bad cold is changed by impure air to a deadly bronchitis.

The relation between filth and disease is not a discovery of the nineteenth century. Epidemics of pneumonia are as old as the plague of Athens. Though modern instances are not rare, it seems necessary to call public attention to the fact that the disease owes its fatality, if not its prevalence, to filth.

It has been affirmed by Dr. Sturges, of London, that pneumonia of a most dangerous form may be the sole expression of a poison, *similar to, if not identical with*, that of *fever*.

It has been found that the larger the actual population of a locality the greater its relative death-rate from pneumonia, and increase in density of population is followed by increase in mortality from it. We may, therefore, conclude that pure air and warmth are the true prophylactics against pneumonia. Happily, an adequate supply of pure air is still one of the features of our climate, and it is within the power of most to avail themselves of it.

From the early history of our country we glean a few notes concerning the climate as it was over two centuries ago. In a description of New Netherland, published at Amsterdam in 1621–32 (Doc. Hist. of N. Y., Vol. 3), may be found an allusion to the harvest as "very abundant in consequence of the mildness of the climate;" also, a reference to South [Delaware] bay as of a "more temperate country" than either north or south of it. "There is no winter there save in January, and then but for a few days." A Journal of New Netherlands, written in 1641–6 (Doc. Hist. of N. Y., Vol. 4), describes the air as "very temperate, inclining to dryness, healthy, little subject to sickness."

The historical records of our own State bear testimony, not only to the permanency, but the healthfulness of our climate. In Whitehead's

"East Jersey under the Proprietors" may be found a copy of "Scot's Model of the Government of the Province of East Jersey," printed at Edinburgh in 1685. It was published to induce emigration to America, and contains several letters written in 1683–5, by the early occupants of the provinces. In all their correspondence with their friends in England and Scotland they uniformly expressed their delight with the climate of the country and its salubrity.

In 1683, Deputy-Governor Thomas Rudyard, writing of the changeable wind and weather, says: "Yet this Variation creates not cold, nor have we the tenth part of the cold as we have in England. I never had any since I came, and in the midst of Winter and Frosts could endure it with less cloaths than in England. * * * I never had better health nor my family." One correspondent says: "The air in this countrey is very wholesome, and although it alter suddenly, sometimes being one day hot and another cold, yet people are not so subject to catch cold or to be distempered by it as in our countrey of England."

Another, writing from Elizabeth Town, in January, 1685, remarks that "the weather here is constantly clear; the sun rises and setts free of clouds. * * * We have at present sharp frosts and a good deal of snow; three dayes of vitrefying frosts this winter; had not its match for cold these 16 years by gone, as the Inhabitants do inform us. * * * I reckon the winter to consist only of nights, for the *Sun's* appearance by day moderateth the cold and melts the Frost. I do not find the cold here to cause obstructions or coughs; the Air is ever transparent."

Charles Gordon, writing to his brother, Dr. John Gordon, says he is "not troubled with coughs and head-aikes, as in Edinburgh." He advises his brother not to come to East Jersey as a "*Doctor of Medicine*," for, with the exception of "some Agues, and some cutted legs and fingers, * * * there is little or no Imployment this way."

Although it is possible to record further evidence of this sort, enough has been given to show that the climate has not materially changed since the first settlement of this province by the whites.

The removal of forests and the upturning of soil doubtless have contributed to modification of the conditions of the climate.

Without doubt, population, by its increase and density, has a deteriorating influence upon the healthfulness of communities.

Still, the salubrity of our climate continues to be largely under human control.

TABLE OF MEAN TEMPERATURE FOR THE YEAR AND SEASONS FOR THE CLIMATIC DIVISIONS OF THE STATE.

	Year.	SEASONS.				MARCH OF SEASONS.			
		Spring.	Summer.	Autumn.	Winter.	Winter to Spring.	Spring to Summer.	Summer to Autumn.	Autumn to Winter.
Newton	51.12	47.95	71.92	58.55	31.07	16.88	23.97	18.37	22.48
Paterson	51.77	48.77	72.35	54.93	81.04	17.73	23.58	17.42	23.89
Newark	52.44	50.37	73.57	54.91	81.03	19.34	23.20	18.66	23.88
New Brunswick	47.90	38.54	69.07	53.48	30.53	8.01	80.53	15.59	22.95
Freehold	50.76	47.14	71.80	54.03	30.08	17.06	24.66	17.77	23.95
Vineland	53.28	50.47	74.32	55.03	33.32	17.15	23.85	19.29	21.71
Sandy Hook	52.50	47.97	72.10	57.09	32.87	15.10	24.13	15.01	24.22
Barnegat	51.80	47.16	70.41	56.15	33.51	13.65	23.25	14.26	22.64
Cape May	54.80	50.18	72.00	59.51	37.58	12.55	21.87	12.49	21.98

CLIMATOLOGICAL OBSERVATIONS AND RECORDS.

In the study of disease it is important that records be preserved for comparison, not only with epidemics, but also with such other diseases as are recognized to be affected by changes of climate. What are known as the summer diseases of the digestive tract are not infrequently dependent not less upon barometrical than thermometrical changes. The varied kinds of pulmonary diseases are still more influenced by climate. It is always possible, by comparison of one part of the State with another, to discern great diversity of climate, and to no small extent a corresponding influence upon these diseases.

The places selected for observation are nearly the same as before. They are intended to represent not only different localities in the State, but were chosen also with reference to geological varieties. It is somewhat remarkable that no complete records are kept at any of the colleges of the State. The following are the observers for the past year:

I. Newton, Miss E. Foster.
II. Paterson, Wm. Furgason.
III. Newark, F. W. Ricord.
IV. New Brunswick, P. V. Spader, Esq.
V. Sandy Hook, U. S. Signal Service.
VI. Vineland, C. H. Adams, M.D.
VII. Barnegat, U. S. Signal Service.
VIII. Cape May Point, U. S. Signal Service.

The tables of New York, Philadelphia and Easton are valuable for comparison.

METEOROLOGICAL SUMMARY OF VARIOUS STATIONS, FROM JULY 1ST, 1884, TO JULY 1ST, 1885.

STATION, DENNIS LIBRARY, NEWTON, N. J.

Latitude, 41° 2′ 45″ N.; Longitude, 2° 19′ 48″ E. Altitude, 660 feet.

OBSERVER, MISS E. FOSTER.

	BAROMETER. Reduced to 32°.			THERMOMETER.				Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (inches).	Days when Precipitation equaled 0.01.	Cloudy Days.	Rain-fall on Days.	Thunder and Lightning on Days.	Snow-fall on Days.	Fog.	Hail.	Frost.	Lunar Halos.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean Daily Range.													
1884.																				
July	29.253	28.836	29.112	93.7	54.9	70.79	20.8	66.79	S.W., N.W.	5.31	....	14	6	15	8	....	2	1	....	3
August	29.575	28.966	29.301	93.5	44.0	71.24	20.1	73.66	S.W.	4.80	....	10	9	11	10	....	3	....	1	4
September	29.741	28.999	29.351	90.2	41.8	67.00	20.5	67.58	S.W.	1.43	....	4	2	6	9	....	4	....	2	2
October	29.806	29.000	29.368	79.8	29.5	53.43	17.9	67.39	S.W., N.W.	3.72	Trace.	11	9	12	2	1	3	1	5	2
November	29.680	28.733	29.281	61.5	19.0	41.12	17.5	63.66	S.W.	3.95	1.2	8	8	7	....	3	....	....	14	2
December	29.939	28.790	29.352	62.0	−6.0	31.93	14.7	72.24	S.W., N.E.	5.26	19.0	14	21	10	....	8	6	....	22	....
1885.																				
January	29.906	28.558	29.278	58.0	1.5	27.80	16.3	66.15	S.W., N.W.	5.41	11.5	11	7	9	....	7	1	....	24	....
February	29.632	28.403	29.169	43.0	−4.5	20.15	16.2	69.02	N.E., N.W.	3.82	24.0	14	5	5	....	11	....	....	28	....
March	29.649	28.747	29.231	58.5	0.5	27.22	17.4	64.50	N., S.W.	1.38	8.0	10	4	5	....	10	....	....	28	2
April	29.790	28.726	29.243	87.4	22.0	48.73	23.5	55.23	S.W., N.	1.97	Trace.	8	7	8	....	4	2	....	11	2
May	29.492	28.847	29.217	87.2	34.9	59.43	22.0	58.09	N.E., S.E.	2.99	Trace.	11	10	11	1	1	2	....	4	2
June	29.522	28.706	29.235	96.5	45.7	69.64	26.9	58.00	S.W.	1.89	....	7	2	9	7	....	1	....	....	....
For the year	29.666	28.775	29.260	75.52	23.79	49.04	19.48	65.19	S.W.	41.42	63.7	122	90	108	37	45	24	2	139	19

* Including melted snow.

REMARKS.—July, 1884—Cold and wet. Barometer much below the mean. Scarlatina prevalent. August—Mean temperature 1.02° below the average. Rain-fall 2.6 inches in excess. Frost on the 25th. Earthquake shock on the 10th, after which the nights were cold and wet, with heavy dews. Foul odors at night. Diarrheal diseases and much dysentery developed. September—Very hot and dry. Remarkable for the absence of cloudy days. Dews frequent and very heavy. Dysentery and diphtheria prevalent. October—Had wide range of temperature. Rains were equally distributed. Diphtheria prevalent and fatal. An increase of rheumatism noticed. November—Mild until the 18th, then the ground was frozen all day. Catarrhal disorders prevailed at the close of the month. Notwithstanding the exceedingly capricious weather of December and January, the winter of 1884-5 was very severe, with much snow in February. There was a marked absence of high winds. The mean temperature of January, 1885, was 3.12° above the average. The ground was bare of snow until the 24th. The month entered with no frost in the ground. No sickness developed until after the flooding of cellars, from the 16th to the 26th. February was continuously cold, one day only (28th) having a mean above 32°. The severe cold checked the usual flow of water in cellars. There were 24 inches of snow on the ground at the end of the month. Children, particularly, suffered from tonsillitis, with constriction of bladder; whooping-cough, complicated with pneumonia, and an epidemic of mumps. One death from peritonitis. Rheumatism prevailed. A slight epidemic of sore eyes followed a season of cold, west winds. March was the coldest on record. The long continuance of winter into the spring month was enfeebling to many constitutions. Water-supply low. Pleurisy somewhat. Whooping-cough and mumps lingered. Spring, 1885—Mean temperature 3.21° lower than in 1884. Rain-fall was deficient. April, May and June had average warmth. June had low humidity. A sporadic case of measles occurred in the latter part of June. Otherwise the community was remarkably free of sickness.

STATION, PATERSON, N. J.

Latitude, 40° 55′ N.; Longitude, 74° 11′ W. Height of Rain Gauge above Sea Level, 142 feet.

OBSERVER, WILLIAM FERGASON, CITY SURVEYOR.

	Barometer. Reduced to 32°.			Thermometer.			Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (days of).	Days when Precipitation equaled 0.01.	Cloudy Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.						
1884.												
July	....	....	....	90	60	70	....	S. W.	6.46	....	11	......
August	....	....	....	93	60	70	....	S. W.	6.42	....	10	......
September	....	....	....	93	49	68	....	S. & S. W.	.58	....	2	......
October	....	....	....	84	32	51	....	N. W. & W.	3.29	....	12	......
November	....	....	....	67	28	40	....	W. N. W.	2.76	....	7	......
December	....	....	....	56	-2	31	....	N. E. & N.	5.95	5	8	......
1885.												
January	....	....	....	60	4	30	....	N. E.	3.47	3	9	......
February	....	....	....	41	-4	23	....	N. W.	4.09	4	8	......
March	....	....	....	58	8	31	....	S. W.	.56	1	4	......
April	....	....	....	85	29	47	....	S. W. & N.	1.64	1	8	......
May	....	....	....	88	37	60	....	S. E & N.	2.27	....	6	......
June	....	....	....	94	38	67	....	S. W.	1.39	....	8	......
For the year.	....	....	....	....	....	49	....	....	38.88	14	93	......

* Including melted snow.

REMARKS.—Earthquake shock at 2:05 P. M., August 10th, 1884.

STATION, NEWARK, N. J.

Latitude, 40° 44′ N.; Longitude, 74° 10′ W. Height of Barometer Cistern above Sea Level, 35 feet.

OBSERVER, F. W. RICORD.

	Barometer. Reduced to 32°.			Thermometer.			Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (days of).	Days when Precipitation equaled 0.01.	Cloudy Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.						
1884.												
July	30.100	29.750	29.911	89.50	55.00	72.015	....	N. W.	5.280	....	11	16
August	30.375	29.800	30.068	91.00	57.00	71.887	....	S. W.	5.390	....	13	18
September	30.510	29.750	30.148	90.00	46.00	66.883	....	N. W.	.200	....	2	5
October	30.540	29.800	30.164	82.25	30.00	54.090	....	N. W.	3.520	....	9	10
November	30.325	29.350	29.964	61.00	21.00	42.508	....	N. W.	2.920	1	6	6
December	30.480	29.515	30.063	59.50	2.00	34.048	....	N. W.	5.900	6	9	13
1885.												
January	30.800	29.390	30.072	52.00	5.00	31.653	....	N. W.	3.335	2	6	12
February	30.490	29.150	30.032	48.00	0.00	24.500	....	N. W.	5.850	6	9	7
March	30.500	29.600	30.476	60.00	7.50	30.855	....	N. W.	1.430	3	6	5
April	30.570	29.450	30.384	66.00	28.00	50.560	....	N. E.	2.080	1	7	8
May	30.260	29.650	29.845	88.00	42.00	59.390	....	N. E.	2.030	....	7	17
June	30.280	29.630	29.998	93.00	54.00	71.810	....	W.	1.390	....	5	3
For the year.	....	....	....	....	....	....	....	....	....	....	....	....

* Including melted snow.

STATION, NEW BRUNSWICK, N. J.

Latitude, 40° 29′ N.; Longitude, 74° 26′ W., or 2° 37′ E. Height, 115 feet.

OBSERVER, P. VANDERBILT SPADER.

	BAROMETER. Reduced to 32°.			THERMOMETER.			Mean Humidity.	Prevailing Wind.	Rain (inches)*.	Snow (days of).	Days when precipitation equaled 0.01.	Cloudy days.
	Max.	Min.	Mean.	Max.	Min.	Mean.						
1884.												
July	....	....	....	....	....	....	....	....	4.80	....	13	....
August	....	....	....	....	....	....	....	....	5.03	....	11	....
September	....	....	....	....	....	....	....	....	0.87	....	3	....
October	....	....	....	....	....	....	....	....	3.16	....	12	....
November	....	....	....	....	....	....	....	....	3.60	....	11	....
December	....	....	....	....	....	....	....	....	5.63	....	14	....
1885.												
January	....	....	....	....	....	....	....	....	3.72	....	11	....
February	....	....	....	....	....	....	....	....	4.93	....	14	....
March	....	....	....	....	....	....	....	....	1.08	....	7	....
April	....	....	....	....	....	....	....	....	2.14	....	14	....
May	....	....	....	....	....	....	....	....	2.01	....	11	....
June	....	....	....	....	....	....	....	....	1 67	....	7	....
For the year	....	....	....	....	....	....	....	....	38.14	....	128	....

* Including melted snow.

STATION, SANDY HOOK, N. J.

Latitude, 40° 28′ N.; Longitude, 74° 0′ W. Height of Barometer Cistern above Sea Level, 28 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	BAROMETER.† Reduced to 32°.			THERMOMETER.			Mean humidity.	Prevailing wind.	Precipitation (inches).*	(Snow days of).	Days when precipitation equaled 0.01.	Cloudy days.
	Max.	Min.	Mean.	Max.	Min.	Mean.						
1884.												
July	29.998	29.563	29.839	89.9	59.7	71.0	73.0	N.W.	6.42	....	15	7
August	30.329	29.685	30.082	91 3	59.0	71.7	79.0	S.	5.12	....	9	9
September	30.475	29.726	30.065	94.1	51.7	70.4	72.6	S.W.	0.03	....	2	3
October	30.570	29.707	30.120	81.1	35.1	57.2	69.9	N.W.	4.21	....	13	7
November	30.452	29.464	30.060	62.4	22.1	44.5	71.9	W.	3.57	....	10	6
December	30.671	29.535	30.147	61.3	0.8	36.1	79.0	N. & E.	5.64	....	15	13
1885.												
January	30.828	29.317	30.090	63.4	6.6	31.0	76.1	W.	4.58	....	13	6
February	30 485	29.075	29.962	53.2	1.5	25.2	74.6	N.W.	4.54	....	15	9
March	30.486	29.551	30.028	56.8	7.4	30.5	70.2	N.W.	0 67	....	7	7
April	30.578	29.470	30.011	80.5	23.0	47.2	68.7	N.W.	2.47	....	12	6
May	30.256	29.586	29.959	83.1	41.1	54.6	76.8	E.	3.67	....	18	7
June	30.282	29.409	29.981	90.4	53.3	67.1	67.8	S.E.	1.41	....	5	3
For the year	....	....	....	....	....	....	....	....	....	....	....	....

* Including rain, melted snow, sleet, hail, dew, fog and frost.

† Corrected for temperature and instrumental error only.

STATION, VINELAND, N. J.

Latitude, 39° 29′; Longitude, 75° 1′ W. Height of Barometer Cistern above Sea Level, 110 feet.

OBSERVER, O. H. ADAMS, M.D.

	BAROMETER. Reduced to 32°.			THERMOMETER.			Mean Humidity.	Prevailing Wind.	Rain (inches).*	Snow (days of).	Days when Precipitation equaled 0.01.	Cloudy Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.						
1884.												
July	29.955	29.533	29.774	95	59	75.29	72.21	S.W., N.W	3.260	....	8	9
August	30.141	29.639	29.925	91	56	72.87	80.43	S.W., N. E.	2.628	....	9	10
September	30.359	28.925	30.014	92	43	69.54	77.67	S.W.	0.471	....	3	4
October	30.439	28.889	30.031	89	26	58.22	69.24	S W.	0.795	....	7	12
November	30.336	29.026	29.914	67	16	43.22	78.19	S.W	2.812	....	6	8
December	30.498	29.493	30.096	64	-4	37.66	80.12	S.W., N. E	6.534	....	11	16
1885.												
January	30.678	29.370	30.038	67	5	32 24	78.97	S.W.	3.670	....	8	10
February	30.340	28.961	29.865	54	1	25 86	75.09	N.W.	3.786	....	9	6
March	30.332	29.551	29.928	64	7	31.79	62.66	N.W.	.914	....	5	0
April	30.444	29.401	29 865	84	27	51.83	63.61	N.W., N.E	2.074	....	6	7
May	30.112	29.531	29.854	85	41	61.97	73.61	N.W., N E	3.452	....	6	8
June	30.160	29.486	29.851	97	51	70.03	69.31	S W., N.W.	1 312	....	4	5
For the year.	....	....	29.929	....	....	52.54	73.42	....	33 330	....	83	100

* Including melted snow.

STATION, BARNEGAT CITY, N. J.

Latitude, 39° 46′ N.; Longitude, 74° 6′ W. Height of Barometer Cistern above Sea Level, 22 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	BAROMETER.† Reduced to 32°.			THERMOMETER.			Mean Humidity.	Prevailing Wind.	Precipitation (inches).*	Snow (days of).	Days when precipitation equaled 0 01.	Cloudy days.
	Max.	Min.	Mean.	Max.	Min.	Mean.						
1884.												
July	29.985	29.571	29 843	88.8	56.1	70.5	76.2	S.W.	3.73	....	12	7
August	30.312	29.716	30.030	86.3	60.7	71.1	85.8	S.W.	5.04	....	11	10
September	30.445	29.733	30.088	85.5	51.7	69.3	82.9	S.W.	1.05	....	4	3
October	30.570	29.733	30.117	81.1	32.6	58.8	81.0	S.W.	2.19	....	13	7
November	30.457	29.409	30.054	65.6	24 6	46.4	80.9	N.W.	2.68	....	7	6
December	30.616	29.601	30.137	62.1	‡—0.2	38.6	83.8	N.	7.09	....	12	13
1885.												
January	30.802	29.304	30.092	58.8	8.6	33.3	81.1	N.W.	4.34	....	12	6
February	30.492	29.088	29.955	54.2	4.7	27.0	80.4	N.W.	1.47	....	11	7
March	30.477	29.575	30.029	54.9	9.4	32.3	77.7	N.W.	0.23	....	7	5
April	30.590	29.444	30.012	72.0	28.4	47.5	76.6	W., N.W.	0.89	....	10	4
May	30.234	29.520	29.946	75.2	39.1	54 6	85.0	N. E.	1.47	....	15	7
June	30.286	29.435	29.967	89.6	52.9	66.3	78.7	S.	0.72	....	8	3
For the year.	....	....	....	....	....	....	....	....	....	....	....	......

* Including rain, melted snow, sleet, hail, dew, fog and frost.

† Corrected for temperature and instrumental error only.

‡ Below zero, Fahrenheit.

STATION, CAPE MAY POINT, N. J.

Latitude, 38° 56′ N.; Longitude, 74° 58′ W. Height of Barometer Cistern above Sea Level, 27 feet.

OBSERVER, U. S. SIGNAL SERVICE.

	BAROMETER.† Reduced to 32°.			THERMOMETER.			Mean Humidity.	Prevailing Wind.	Precipitation (inches).*	Snow.	Days when Precipitation equaled 0.01.	Cloudy Days.
	Max.	Min.	Mean.	Max.	Min.	Mean.						
1884.												
July	30.012	29.616	29.846	89.0	62.0	72.4	80.9	S.	4.44	....	10	5
August	30.248	29.710	30.017	85.6	57.2	72.7	84.9	S.	5.30	....	7	9
September	30.513	29.728	30.064	84.0	47.9	70.9	79.1	S.	0.31	....	2	2
October	30.571	29.749	30.118	85.7	36.0	60.3	75.9	S.	1.33	....	9	4
November	30.432	29.373	30.054	69.0	22.0	48.3	77.6	N.W.	2.30	....	9	6
December	30.607	29.603	30.139	59.0	4.6	40.0	79.3	N.	6.87	....	10	15
1885.												
January	30.789	29.374	30.097	56.8	13.1	36.4	78.5	N.W.	4.98	....	12	4
February	30.454	29.216	29.950	53.0	4.5	29.6	77.8	N.W.	3.71	....	11	6
March	30.449	29.595	30.025	52.3	10.8	34.3	79.7	N.W.	2.29	....	14	8
April	30.540	29.441	30.007	82.5	31.0	48.9	79.3	S.	1.87	....	8	4
May	30.167	29.506	29.916	76.8	43.1	57.4	83.9	E.	5.20	....	14	7
June	30.239	29.461	29.983	85.2	50.2	67.6	80.1	S., S.E.	2.23	....	7	3
For the year.	....	....	....	....	....	....	....	....	....	....	....	....

* Including rain, melted snow, sleet, hail, dew, fog and frost.

† Corrected for temperature and instrumental error only.

As by law this report is required to be in the hands of the Governor by December 1st, we have not considered it practicable to obtain climatological reports up to the date of January 1st, but follow the divisions of our statistical year.

NUMBER OF MARRIAGES, BIRTHS AND DEATHS, BY TOWNSHIPS.

FOR THE YEAR ENDING JUNE 30, 1885.

ATLANTIC COUNTY.

	M.	B.	D.
Absecon	8	15	12
Atlantic City	95	172	187
Buena Vista	....	22	12
Egg Harbor City	81	42	24
Egg Harbor Township	38	102	62
Galloway	18	46	43
Hamilton	9	85	35
Hammonton	12	68	45
Mullica	1	10	18
Weymouth	1	8	2
	203	515	435

BERGEN COUNTY.

	M.	B.	D.
Englewood	31	59	76
Franklin	16	88	25
Harrington	15	20	35
Hohokus	16	42	48
Lodi	20	90	72
Midland	4	24	28
New Barbadoes	50	121	87
Palisade	7	38	24
Ridgefield	12	75	45
Ridgewood	11	32	41
Saddle River	4	23	20
Union	11	104	65
Washington	20	68	46
	217	729	602

BURLINGTON COUNTY.

	M.	B.	D.
Bass River	4	26	20
Beverly	23	8	29
Bordentown	52	110	93
Burlington	70	132	188
Chester	28	65	51
Chesterfield	5	22	15
Cinnaminson	18	63	34
Delran	11	23	39
Eastampton	....	12	4
Evesham	8	26	20
Florence	1	59	22
Little Egg Harbor	12	58	30
Lumberton	....	6	6
Mansfield	10	42	30
Medford	12	19	39
Mt. Laurel	....	33	15
New Hanover	10	42	22
Northampton	54	96	112
Pemberton	25	49	45
Randolph	....	13	6
Shamong	3	8	16
Southampton	9	48	29
Springfield	1	27	28
Washington	2	12	3
Westampton	....	10	8
Willingboro	....	14	5
Woodland	....	....	3
	358	1,023	912

CAMDEN COUNTY.

	M.	B.	D.
Camden City	582	860	968
Centre	2	52	27
Delaware	....	25	18
Gloucester City	30	129	92
Gloucester	11	54	64
Haddon	30	68	53
Stockton	12	64	94
Waterford	8	56	29
Winslow	9	54	25
	634	1,362	1,370

CAPE MAY COUNTY.

	M.	B.	D.
Cape May City	13	42	24
Dennis	10	51	36
Lower	14	50	35
Middle	16	55	35
Upper	19	47	31
	72	245	161

CUMBERLAND COUNTY.

	M.	B.	D.
Bridgeton	111	258	179
Commercial	15	22	31
Deerfield	11	21	16
Downe	12	10	19
Fairfield	16	78	41
Greenwich	9	27	28
Hopewell	10	27	31
Landis	64	154	127
Lawrence	5	18	12
Maurice River	25	47	41
Millville	70	255	149
Stoe Creek	7	17	11
	355	934	685

ESSEX COUNTY.

	M.	B.	D.
Belleville	34	49	55
Bloomfield	33	136	98
Caldwell	18	37	50
Clinton	7	38	37
East Orange	34	180	141
Franklin	7	25	11
Livingston	7	11	24
Milburn	10	36	47
Montclair	16	144	70
Newark	1,274	3,494	3,729
Orange	132	449	300
South Orange	28	82	45
West Orange	11	60	55
	1,611	4,741	4,662

GLOUCESTER COUNTY.

	M.	B.	D.
Clayton	15	42	42
Deptford	4	36	26
East Greenwich	9	24	24
Franklin	10	46	54
Glassboro	21	78	39
Greenwich	5	52	43
Harrison	6	32	32
Logan	12	38	24
Mantua	8	40	22
Monroe	14	34	37
South Harrison	14	11	5
Washington	8	29	17
West Deptford	2	28	18
Woodbury	36	70	51
Woolwich	22	43	32
	186	598	461

HUDSON COUNTY.

	M.	B.	D.
Bayonne	59	196	243
Guttenberg	7	28	33
Harrison	14	168	159
Hoboken	815	816	843
Jersey City	877	1,661	3,442
Kearny	2	30	46
North Bergen	12	86	225
Town of Union	101	216	217
Union	4	35	37
Weehawken	2	32	36
West Hoboken	64	191	128
	1,457	3,459	5,409

HUNTERDON COUNTY.

	M.	B.	D.
Alexandria	2	23	18
Bethlehem	17	44	33
Clinton	31	63	43
Delaware	26	69	43
East Amwell	17	35	14
Franklin	11	19	17
Frenchtown	8	13	11
High Bridge	10	25	29
Holland	15	29	19
Kingwood	3	21	20
Lambertville	45	101	67
Lebanon	26	43	44
Raritan	21	34	19
Readington	29	57	35
Tewksbury	13	36	35
Union	9	8	7
West Amwell	1	24	12
	284	634	466

MERCER COUNTY.

	M.	B.	D.
Chambersburg	45	111	140
East Windsor	14	51	85
Ewing	2	6	81
Hamilton	14	36	37
Hopewell	31	65	54
Lawrence	5	15	25
Millham	3	52	29
Princeton	27	70	116
Trenton	380	489	601
Washington	1	25	26
West Windsor	6	26	19
	528	946	1,168

MIDDLESEX COUNTY.

	M.	B.	D.
Cranbury	22	88	35
East Brunswick	24	60	52
Madison	8	11	13
Monroe	18	24	31
New Brunswick	149	430	336
North Brunswick	7	17	26
Perth Amboy	41	195	166
Piscataway	22	53	40
Raritan	20	55	47
Sayreville	14	21	20
South Amboy	17	102	69
South Brunswick	9	37	47
Woodbridge	11	87	64
	357	1,180	946

MONMOUTH COUNTY.

	M.	B.	D.
Atlantic	7	22	24
Eatontown	35	31	39
Freehold	27	67	100
Holmdel	11	24	27
Howell	28	67	38
Manalapan	17	87	33
Marlboro	8	29	29
Matawan	18	47	47
Middletown	42	94	100
Millstone	11	22	22
Neptune	54	104	122
Ocean	67	212	126
Raritan	37	89	94
Shrewsbury	63	138	132
Upper Freehold	35	73	51
Wall	45	129	81
	500	1,215	1,065

MORRIS COUNTY.

	M.	B.	D.
Boonton	15	63	53
Chatham	21	68	71
Chester	11	60	38
Hanover	20	55	110
Jefferson	2	26	21
Mendham	14	25	22
Montville	2	11	14
Morristown	59	145	128
Mount Olive	9	33	31
Passaic	11	19	20
Pequannock	10	67	45
Randolph	56	168	107
Rockaway	17	66	98
Roxbury	18	30	27
Washington	20	58	28
	280	894	808

OCEAN COUNTY.

	M.	B.	D.
Berkeley	1	24	20
Brick	15	71	71
Dover	21	45	41
Eagleswood	7	10	17
Jackson	6	36	20
Lacey	7	12	19
Manchester	5	13	10
Ocean	....	5	8
Plumstead	17	45	31
Stafford	9	22	15
Union	5	27	16
	93	310	268

PASSAIC COUNTY.

	M.	B.	D.
Acquackanonk	3	27	30
Little Falls	13	30	33
Manchester	1	11	22
Passaic	50	265	139
Paterson	562	1,605	1,284
Pompton	37	50	38
Wayne	3	14	14
West Milford	18	42	38
	687	2,044	1,598

SALEM COUNTY.

	M.	B.	D.
Alloway	11	37	19
Elsinboro	1	2	4
Lower Alloways Creek	6	12	18
Lower Penns Neck	8	10	23
Mannington	2	32	33
Oldmans	13	28	18
Pilesgrove	19	67	54
Pittsgrove	16	73	19
Quinton	2	32	18
Salem	63	122	106
Upper Penns Neck	8	33	25
Upper Pittsgrove	5	14	12
	154	462	349

SOMERSET COUNTY.

	M.	B.	D.
Bedminster	9	23	24
Bernards	22	37	36
Branchburg	2	20	19
Bridgewater	68	141	143
Franklin	18	53	50
Hillsborough	25	40	41
Montgomery	10	38	35
North Plainfield	24	72	52
Warren	7	18	18
	185	442	418

SUSSEX COUNTY.

	M.	B.	D.
Andover	6	15	15
Byram	16	17	28
Frankford	15	14	24
Green	8	10	14
Hampton	8	10	8
Hardyston	22	6	31
Lafayette	5	7	11
Montague	....	8	7
Newton	17	22	46
Sandyston	6	11	15
Sparta	8	20	35
Stillwater	12	21	19
Vernon	11	18	23
Walpack	10	10	6
Wantage	20	38	42
	159	227	324

UNION COUNTY.

	M.	B.	D.
Clark	....	3	3
Cranford	2	2	22
Elizabeth	259	918	697
Fanwood	6	23	19
Linden	4	32	28
New Providence	6	3	14
Plainfield	51	174	141
Rahway	46	74	107
Springfield	8	27	17
Summit	13	41	27
Union	3	40	55
Westfield	13	40	35
	411	1,377	1,165

WARREN COUNTY.

	M.	B.	D.
Allamuchy	....	4	4
Belvidere	12	39	21
Blairstown	7	23	15
Franklin	9	24	21
Frelinghuysen	6	17	20
Greenwich	10	24	18
Hackettstown	31	48	40
Hardwick	....	6	5
Harmony	7	23	17
Hope	12	48	28
Independence	9	12	12
Knowlton	6	24	27
Lopatcong	6	46	21
Mansfield	14	10	22
Oxford	22	112	59
Pahaquarry	1	5	1
Phillipsburg	65	234	148
Pohatcong	8	28	16
Washington	38	68	42
	258	795	540

TOTALS OF MARRIAGES, BIRTHS AND DEATHS FOR ALL THE COUNTIES.

	M.	B.	D.
Atlantic	203	515	435
Bergen	217	729	602
Burlington	358	1,028	912
Camden	634	1,362	1,370
Cape May	72	245	161
Cumberland	355	934	685
Essex	1,611	4,741	4,662
Gloucester	186	593	461
Hudson	1,457	3,469	5,409
Hunterdon	284	634	466
Mercer	528	946	1,163
Middlesex	357	1,130	946
Monmouth	500	1,215	1,065
Morris	280	891	808
Ocean	93	310	268
Passaic	687	2,014	1,598
Salem	154	462	349
Somerset	185	442	418
Sussex	159	227	324
Union	411	1,377	1,165
Warren	258	795	540
	8,989	24,077	23,807

CONDENSED TABLES OF POPULATION

ARRANGED FOR VITAL STATISTIC COMPARISONS.

CENSUS OF 1885.

Abstract of Census Returns for the State of New Jersey—Semi-Decennial Census—1885.

Census by Counties.	Total population.	Dwelling houses.	Families.	NATIVE BORN. White Males.	White Females.	Colored Males.	Colored Females.	FOREIGN BORN. Males, Irish.	Females, Irish.	Males, German.	Females, German.	Males, all other Nationalities.	Females, all other Nationalities.	AGE OF MALES BY CLASSES. Five years of age and under.	Five to twenty.	Twenty to sixty.	Over sixty.	AGE OF FEMALES BY CLASSES. Five years of age and under.	Five to twenty.	Twenty to sixty.	Over sixty.
Atlantic	22856	4844	4887	9321	9181	698	627	117	199	732	651	520	360	1227	3388	5924	824	1160	3378	5678	777
Bergen	39880	7360	8285	14602	15273	909	984	915	1358	1895	1441	1376	1132	2224	5797	9333	2067	3134	6845	9027	1453
Burlington	57558	11579	12100	25162	26026	1287	1366	907	1126	609	440	386	249	3124	8708	14073	2446	3036	8837	14545	2789
Camden	76685	15114	15647	30500	31635	3583	3931	1275	1570	1238	1031	1071	828	4243	12016	19513	1842	4098	12507	20093	2378
Cape May	10744	2186	2348	4993	4863	285	306	56	71	89	20	74	37	576	1617	2722	508	580	1697	2564	480
Cumberland	41982	8816	9431	19005	18767	1030	1029	174	207	383	299	599	489	2501	6935	10132	1653	2410	6468	11276	1612
Essex	213761	29241	46010	78158	78355	2220	2741	8075	1160	13874	12712	5832	5167	13148	32772	51998	5012	13182	33938	57699	6065
Gloucester	27603	5741	6013	12669	12140	609	561	259	292	491	285	192	102	1559	4604	6966	1075	1546	4189	6580	1084
Hudson	210342	25768	48135	79782	78079	910	1086	15773	16889	15971	15012	9263	7577	17443	39712	61241	4157	16339	40322	56848	4795
Hunterdon	37420	7959	8571	17239	18083	218	209	508	506	212	140	179	101	1963	5791	8725	1880	1996	6092	9072	1898
Mercer	66785	12636	18501	26084	26717	1627	1577	2060	2188	1828	1471	2464	1826	3777	10231	18020	1868	3635	9977	17104	2173
Middlesex	56180	9379	11412	21678	22081	822	807	2252	2329	2099	1362	1652	1100	3237	9071	14411	1776	3401	8609	13708	1967
Monmouth	62324	12524	18457	26656	27485	1852	1833	1242	1455	736	447	446	332	3633	9792	14977	2349	3654	10139	15285	2495
Morris	50675	8897	10122	20801	21871	386	440	1649	2169	629	449	1471	1307	3138	8027	11810	1975	3082	8180	12510	2058
Ocean	15586	3284	3405	7674	7307	75	48	78	103	69	51	104	77	897	2668	3789	681	842	2582	3632	595
Passaic	68374	11863	17013	26659	27844	515	527	8716	4711	2731	2418	7445	6913	5181	13709	20316	1720	4998	13814	21432	2174
Salem	23873	5323	5699	10745	10579	1499	1388	180	196	252	159	208	172	1392	4216	6725	1018	1469	3951	6013	1059
Somerset	27425	5250	5753	11032	11407	793	767	582	704	758	585	520	327	1378	4545	6526	1256	1294	4231	6915	1285
Sussex	22401	4291	4752	10796	10680	63	60	187	208	85	63	171	98	1248	3557	5408	1059	1163	3363	5547	1066
Union	61839	10316	12659	21981	21777	800	1006	2586	3655	2935	2390	1479	1280	3718	9207	15253	1543	3601	9730	16878	1914
Warren	37787	7896	8294	17431	17562	187	180	582	556	448	317	299	285	2232	6140	9145	1428	2331	5955	9125	1386
Total in State	1278033	230267	267291	487891	497955	20388	21458	48108	52032	48047	41698	35752	29709	77819	202486	316582	38082	76901	204699	320021	41498

Total increase of population in five years, 146,916. Total increase in cities of over 5,000 inhabitants, 118,027. Total foreign population, 250,846. Total increase thereof in five years, 28,646.

Abstract of Census Returns for the Cities of New Jersey of Over 5,000 Population—1885.

Census of Cities.	Dwelling houses.	Families.	Native Born. White Males.	Native Born. White Females.	Native Born. Colored Males.	Native Born. Colored Females.	Foreign Born. Males, Irish.	Foreign Born. Females, Irish.	Foreign Born. Males, German.	Foreign Born. Females, German.	Foreign Born. Males, all other Nationalities.	Foreign Born. Females, all other Nationalities.	Age of Males by Classes. Five years of age and under.	Age of Males by Classes. Five to twenty.	Age of Males by Classes. Twenty to sixty.	Age of Males by Classes. Over sixty.	Age of Females by Classes. Five years of age and under.	Age of Females by Classes. Five to twenty.	Age of Females by Classes. Twenty to sixty.	Age of Females by Classes. Over sixty.	Total number of Inhabitants.
Atlantic City	1725	1753	2949	8090	632	588	80	158	150	125	94	76	431	1011	2299	152	421	1085	2365	178	7942
Bordentown	1211	1212	2384	2701	127	139	185	228	48	36	8	1	276	917	1326	283	277	962	1531	332	5[illegible]57
Burlington	1583	1618	8159	8393	295	825	141	204	38	15	73	47	408	1098	1925	276	882	1103	2092	406	7690
Camden	10524	10852	20895	22229	2326	2752	791	983	889	796	697	526	2799	8235	13180	1049	2666	8911	14202	1542	52881
Gloucester City	1137	1147	2461	2518	....	2	267	865	41	42	143	127	867	978	1462	98	866	9[illegible]0	1614	181	5966
Bridgeton	2093	2278	4456	4639	268	283	19	88	128	112	71	53	560	1550	2517	310	558	1517	2684	874	10065
Millville	1801	1866	4233	4001	64	69	63	72	103	71	86	62	572	1623	2141	214	568	1393	2091	219	8824
Newark	19467	34496	51056	54[illegible]37	1474	1791	5538	7879	12096	11179	4267	8761	9828	23426	37557	3313	9782	24217	40672	4163	152988
Orange	2177	2901	5105	5558	259	803	1002	1337	521	422	401	325	947	2376	8710	255	939	2560	4119	3[illegible]5	15231
Bayonne	1779	2413	4958	4716	29	48	805	794	896	807	631	401	1151	1876	3667	161	1077	1912	3[illegible]79	158	130[illegible]0
Harrison	1008	1335	2046	2201	5	6	586	637	244	249	450	409	523	1098	1508	94	549	1191	1741	102	6[illegible]06
Hoboken	2601	7928	11428	11325	55	52	1949	1959	3960	4351	1475	1167	2566	7226	9966	855	2888	6235	8437	518	37721
Jersey City	16114	30707	52548	51238	771	937	11209	12223	7960	7144	5160	4828	11198	24517	38567	2906	10374	26361	36269	3318	153513
Town of Union	1225	1683	2381	2416	9	9	196	161	1413	1317	268	225	687	1284	2096	157	594	1319	2029	202	8398
Chambersburg	1715	1775	3065	2996	20	27	177	200	442	481	666	519	608	1455	2158	126	583	1450	2010	152	8542
Trenton	6546	6893	18005	18286	761	696	1279	1291	1025	811	1318	964	1842	4791	9895	753	1835	5010	9315	912	34386
New Brunswick	2732	3682	7173	7785	826	427	598	891	440	879	157	182	10[illegible]9	2793	4384	485	1101	2889	4911	666	18258
Perth Amboy	921	1326	2052	2116	25	23	307	293	167	129	652	547	439	895	1740	129	408	963	1574	163	6811
Long Branch	1015	1154	2050	2182	159	143	109	158	183	87	61	60	330	708	1330	146	316	790	1377	143	5140
Morristown	1808	1600	3146	3729	187	283	365	698	80	86	115	12[illegible]	445	1104	2053	286	512	1382	2653	315	8760
Passaic	1087	1621	2607	2708	55	58	422	479	249	197	824	736	601	1298	2110	144	591	1338	2[illegible]66	178	83[illegible]6
Paterson	8656	18105	19087	20424	824	849	8098	4002	2172	1983	6071	5763	3810	10389	15893	1140	3629	10511	16781	1620	63273
Salem	1293	1291	2274	2501	209	2[illegible]3	58	81	60	43	23	14	317	792	1808	207	297	822	1175	298	5516
Elizabeth	4960	6401	10843	11578	280	325	1656	2154	9021	1679	857	723	2097	4990	7992	572	2014	5252	8444	758	32119
Plainfield	1474	1976	3361	3790	192	306	248	530	145	156	84	101	474	1227	2118	209	458	1287	2879	261	8918
Rahway	1345	1518	2632	2882	187	176	154	255	194	175	133	123	411	994	1620	224	388	1073	1835	316	6861
Phillipsburg	1690	1712	3524	3585	14	21	236	229	192	136	62	59	563	1882	1903	178	576	1371	1885	200	8058
Total	99215	146238	244868	254021	9003	10341	31488	37817	35206	32458	21856	21370	45279	110035	176225	14152	43674	113887	180136	18040	701428

Abstract of Census Returns for the State of New Jersey, 1885, showing the Males and Females of the Native and the Foreign Population, and the respective totals by Counties; also the total Population at ages corresponding to those in the Tables of the Bureau of Vital Statistics.

By Counties.	Population.	Dwellings.	Families.	Native Born.		Foreign Born.		Total.		Five years of age and under.	Five to twenty.	Twenty to sixty.	Over sixty.
				Males.	Females.	Males.	Females.	Males.	Females.				
Atlantic	22856	4844	4887	10019	9758	1369	1210	11388	10968	2387	6766	11602	1601
Bergen	39880	7360	8285	15511	16257	4186	3926	19697	20183	5358	12612	18360	3520
Burlington	57558	11579	12100	26449	27392	1902	1815	28351	29207	6160	17545	28618	5235
Camden	76685	15114	15547	34083	35566	3587	3449	37670	39015	8341	24523	39606	4215
Cape May	10744	2186	2348	5278	5169	169	128	5447	5297	1156	3314	5286	988
Cumberland	41982	8816	9431	20055	19776	1156	995	21211	20771	4911	13398	20408	3265
Essex	213764	29221	46010	75408	81096	27781	19089	103189	100135	26330	66660	109697	11077
Gloucester	27603	5741	6013	13278	12701	945	679	14223	13380	3105	8793	13546	2159
Hudson	240342	25768	48135	80692	79165	41007	39478	121699	118648	33772	80034	117584	8952
Hunterdon	37420	7959	8571	17457	18292	924	747	18381	19089	3959	11886	17797	3778
Mercer	66785	12656	13501	27709	27294	6352	5430	34061	32724	7412	20208	35124	4011
Middlesex	56180	9379	11412	22495	22891	6003	4791	28498	27682	6638	17680	28119	3748
Monmouth	62324	12524	13457	28508	29168	2414	2234	30922	31402	7287	19931	30262	4844
Morris	50675	8897	10122	21187	21811	3752	3925	24939	25736	6170	16157	24320	4028
Ocean	15586	3284	3405	7749	7355	251	231	8000	7586	1739	5200	7421	1226
Passaic	83374	11863	17013	27074	28371	13892	14037	40966	42408	10179	27523	41778	3894
Salem	25373	5323	5599	12244	11967	635	527	12879	12494	2861	8197	12238	2077
Somerset	27425	5250	5753	11825	12174	1860	1566	13685	13740	2667	8776	13441	2541
Sussex	22401	4291	4752	10859	10740	443	359	11302	11099	2406	6920	10950	2125
Union	61839	10816	12659	22781	24783	6950	7825	29731	32108	7819	18937	32126	3457
Warren	37787	7896	8294	17618	17682	1329	1108	18947	18790	4563	12095	18270	2809
Total	1278033	210267	267294	508279	519408	126907	123439	635186	642847	154720	407185	636558	79575

Abstract of Census Returns for the Cities of New Jersey, 1885, showing the Males and Females of the Native and the Foreign Population, and their respective totals in Cities of over 5,000 Inhabitants; also their total Population at ages corresponding to those in the Tables of the Bureau of Vital Statistics.

CENSUS OF CITIES.	Population.	Dwelling houses.	Families.	NATIVE BORN. Males.	NATIVE BORN. Females.	FOREIGN BORN. Males.	FOREIGN BORN. Females.	TOTAL. Males.	TOTAL. Females.	Five years of age and under.	Five to twenty.	Twenty to sixty.	Over sixty.
Atlantic City	7942	1725	1753	3581	3678	324	359	3905	4037	852	2096	4661	330
Bordentown	5857	1211	1212	2511	2840	241	265	2752	3105	553	1879	2860	565
Burlington	7690	1583	1613	3454	3718	252	266	3706	3984	790	2201	4017	682
Camden	52881	10524	10852	23221	24981	2377	2305	25598	27286	5465	17146	27682	2591
Gloucester City	5966	1137	1147	2461	2520	451	534	2912	3054	733	1928	3076	229
Bridgeton	10065	2093	2273	4724	4922	216	203	4940	5125	1113	3067	5201	684
Millville	8824	1804	1866	4297	4070	252	205	4549	4275	1140	3016	4235	433
Newark	152988	19467	34496	52530	56328	21811	22319	74311	78647	19610	47643	78229	7506
Orange	15231	2177	2904	5364	5856	1927	2084	7291	7940	1886	4936	7829	580
Bayonne	13080	1779	2413	4982	4764	1832	1502	6814	6266	2228	3787	6746	319
Harrison	6806	1003	1335	2051	2210	1230	1315	3281	3525	1072	2289	3249	196
Hoboken	37721	2601	7928	11483	11377	7384	7477	18867	18854	4954	13461	18403	903
Jersey City	153513	16114	30707	53314	52175	24329	23695	77643	75870	21572	50881	74836	6224
Town of Union	8398	1225	1683	2390	2425	1877	1706	4267	4131	1281	2633	4125	359
Chambersburg	8542	1715	1775	3085	3022	1285	1150	4370	4172	1191	2905	4168	278
Trenton	34386	6546	6893	13766	13932	3622	3066	17388	16998	3677	9804	19210	1695
New Brunswick	18258	2732	3682	7499	8162	1195	1402	8694	9564	2130	5682	9295	1151
Perth Amboy	6311	921	1326	2077	2139	1126	969	3203	3108	847	1858	3314	292
Long Branch	5140	1015	1154	2209	2325	306	300	2515	2625	646	1498	2707	289
Morristown	8760	1808	1600	3333	3962	560	905	3893	4867	987	2486	4706	581
Passaic	8326	1087	1621	2662	2766	1486	1412	4148	4178	1192	2636	4176	322
Paterson	63273	8686	13105	19411	20773	11341	11748	30752	32521	7439	20900	32174	2760
Salem	5516	1293	1291	2483	2754	141	138	2624	2892	614	1614	2783	505
Elizabeth	32119	4960	6404	11123	11903	4537	4556	15660	16459	4111	10242	16436	1330
Plainfield	8913	1474	1975	3553	4096	477	787	4030	4883	932	2514	4997	470
Rahway	6861	1345	1518	2769	3058	481	553	3250	3611	799	2067	3455	540
Phillipsburg	8058	1690	1712	3538	3606	490	424	4028	4030	1139	2753	3788	378
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RETURNS OF DEATHS FROM ALL CAUSES.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885—By Counties.

COUNTIES. Statistical Divisions	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, Census of 1885.	Death-rate per 1,000.	Death-rate per 1,000 without cities of over 5,000.	Deaths under five in each 100, or comparison of these with total deaths.	Comp'r'tive number of deaths in each 100 from chief preventable diseases.
Atlantic	108	62	27	128	109	435	22,356	19.46	17.21	39.08	26.44
Bergen	138	60	60	160	176	602	39,880	15.10	15.10	32.89	23.75
Burlington	183	89	87	268	273	912	57,558	15.84	14.34	29.82	24.12
Camden	387	170	138	398	270	1,370	76,685	17.87	17.38	40.66	27 81
Cape May	44	13	9	37	57	161	10,744	14.99	14.99	35.40	23.60
Cumberland	169	89	59	172	189	685	41,982	16.32	15.46	37.66	25.26
Essex	1086	779	497	1479	796	4,662	213,764	21.81	13.90	40.00	28.96
Gloucester	93	65	45	102	151	461	27,603	16.70	16.70	34.27	25.62
Hudson	1431	982	529	1761	697	5,409	240,342	22.51	24.25	44.61	28.97
Hunterdon	64	47	29	139	190	466	37,420	12.45	12.45	23.83	15.88
Mercer	262	117	97	322	312	1,163	66,785	17.41	17.69	32.59	22.96
Middlesex	236	131	84	261	225	946	56,180	16.84	16.09	38.79	27.80
Monmouth	238	141	90	282	302	1,065	62,324	17.09	17.09	35.59	21.69
Morris	144	70	67	266	258	808	50,675	15.94	16.22	26.49	18.94
Ocean	44	37	14	78	90	268	15,586	17.19	17.19	30.22	21.27
Passaic	478	221	110	449	281	1,598	83,374	19.17	14.86	43.74	27.85
Salem	81	33	31	88	109	349	25,373	13.75	12.24	32.66	23.50
Somerset	81	35	46	123	133	418	27,425	15 24	15.24	27.75	22.25
Sussex	52	29	35	93	114	324	22,401	14.46	14.46	25.00	15 74
Union	276	177	114	333	260	1,165	61,839	18.84	15.78	38.88	26 18
Warren	116	62	42	167	150	540	37,737	14.31	13.21	32.96	19.44
Total	*5711	3409	2210	7106	5142	23,807	1,278,033	18.63	15.63	38.31	26.17

COUNTIES. Statistical Divisions	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal	Accident.
Atlantic	1	18	...	3	2	8	17	...	66	28	34	31	30	33	30	35	22	9	1	4	7
Bergen	9	13	...	13	4	3	21	1	79	39	32	80	35	57	30	56	28	8	4	8	23
Burlington	6	32	...	21	1	5	48	5	102	54	72	99	56	57	37	97	53	22	...	12	31
Camden	9	63	...	29	2	11	70	1	196	87	121	127	104	90	38	106	49	20	...	15	52
Cape May	1	8	...	4	1	3	1	...	20	9	8	16	7	9	2	30	10	6	...	1	2
Cumberland	6	14	...	21	......	7	27	5	93	46	67	55	56	49	26	52	30	12	...	5	20
Essex	38	110	..	78	17	24	529	14	540	378	313	519	364	293	178	317	189	111	5	62	142
Gloucester	5	11	...	10	......	5	10	...	77	32	40	38	33	25	17	42	28	7	3	3	19
Hudson	44	144	2	319	39	43	340	16	620	375	314	667	514	273	198	277	206	88	10	62	214
Hunterdon	3	13	...	8	......	......	19	4	27	42	53	26	30	45	16	59	30	10	...	4	17
Mercer	8	28	...	17	1	15	59	3	136	97	65	90	64	80	45	151	80	27	1	8	54
Middlesex	7	23	...	33	7	20	29	5	139	74	63	68	54	63	45	72	50	23	4	12	48
Monmouth	17	20	...	7	22	4	39	3	119	60	72	136	72	70	50	98	75	17	3	7	40
Morris	6	17	...	18	......	5	34	2	71	58	64	83	39	59	43	115	53	20	1	16	18
Ocean	2	9	...	......	9	.....	8	...	29	18	28	32	14	12	13	36	16	4	...	3	7
Passaic	17	50	...	17	17	7	86	7	244	103	107	181	129	89	60	101	76	42	...	23	45
Salem	3	19	...	4	......	1	14	...	41	22	82	29	23	18	11	83	15	10	1	3	8
Somerset	6	6	...	5	......	5	30	2	39	16	34	45	19	29	19	46	23	15	...	3	25
Sussex	3	7	...	......	......	2	16	1	22	27	25	45	22	32	10	30	18	9	1	6	11
Union	13	22	...	27	13	11	85	1	133	87	68	127	93	79	40	101	47	24	2	11	35
Warren	5	15	...	12	......	3	14	4	52	21	35	72	33	41	21	46	42	14	...	10	19
Total	209	642	2	616	135	181	1496	74	2845	1673	1647	2566	1791	1503	939	1895	1140	498	36	268	857

* Of those that died under one year, 1,606 died under one month, of which 1,067 died in the larger cities.

Total deaths from consumption for the State, as compared with total deaths, 13.94.

Rates for short periods, or which deal with small numbers, are only approximate, since temporary causes may have been in operation, and small numbers do not eliminate or balance errors which practically disappear in large aggregates. So, five or ten years' analyses are more important than any single year. The number of deaths before twenty, in proportion to the rest, are much more informatory as to local causes affecting health than the total deaths. So, also, the number dying from the zymotic diseases, and especially from fevers, croup, diphtheria, diarrheal diseases, consumption and brain and nervous diseases of children.

Return of Deaths from all Causes and Certain Specified Diseases, in the Cities of the State of New Jersey, of over 5,000 Population, for the Year ending June 30th, 1885.

CITIES HAVING OVER 5,000 POPULATION. Statistical Divisions.	DEATHS AT ALL AGES. Under one.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total including undefined.	Population, census of 1885.	Death-rate per 1,000.	Deaths under five in each 100, or comparison of these with total deaths.	Comparative number of deaths in each 100 from chief preventable diseases.	PRINCIPAL CAUSES OF DEATH.* Remittent fever, &c.	Typhoid fever.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption, male.	Consumption, female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Atlantic County.																														
Atlantic City	49	32	11	64	30	187	7,942	23.54	43.32	25.67	......	5	1	......	1	11	...	30	12	10	12	19	21	13	11	11	4	......	3	4
Burlington County.																														
Bordentown	19	12	6	32	24	93	5,857	15.88	33.33	22.58	......	2	1	......	......	8	...	10	7	6	10	4	7	3	6	11	2	......	......	4
Burlington	39	16	16	59	54	188	7,690	24.45	29.26	15.43	1	4	2	......	2	8	1	11	9	14	25	18	11	4	18	18	5	......	3	9
Camden County.																														
Camden	283	121	111	287	162	968	52,834	18.30	41.74	28.41	8	43	27	2	6	53	...	136	67	89	88	83	56	28	71	26	11	......	11	30
Gloucester City	23	12	8	32	17	92	5,966	15.42	38.04	19.57	......	1	......	......	......	7	...	10	7	14	6	8	5	2	7	7	2	......	......	8
Cumberland Co.																														
Bridgeton	46	27	13	47	42	179	10,065	17.78	40.78	19.55	1	3	......	......	2	2	1	26	15	12	21	19	10	8	11	14	1	......	1	7
Millville	43	21	12	39	34	149	8,824	16.89	42.95	30.87	2	4	1	......	3	3	2	31	13	17	15	8	12	5	6	5	3	......	......	5
Essex County.																														
Newark	885	658	385	1210	572	3729	152,988	21.38	41.38	30.01	31	94	66	16	21	438	8	443	307	258	410	302	203	129	250	151	80	4	42	117
Orange	76	45	33	105	41	300	15,231	19.70	40.33	26.00	......	5	4	......	......	32	3	34	25	19	38	29	17	21	9	10	7	......	6	9
Hudson County.																														
Bayonne	78	42	12	76	34	243	13,080	18.58	49.38	25.10	3	8	4	1	2	15	1	27	13	12	29	32	14	5	14	7	3	......	4	19
Harrison	42	23	20	56	17	159	6,806	23.36	40.88	27.04	1	4	......	......	......	18	...	20	15	12	20	20	5	4	12	4	2	......	2	7
Hoboken	247	127	60	310	109	843	37,721	22.35	43.18	26.33	3	21	10	5	7	47	4	125	62	58	85	84	53	39	53	32	19	4	9	38
Jersey City	869	673	373	1099	423	3442	153,513	22.42	44.80	30.10	24	100	294	28	32	173	10	375	216	200	459	313	170	123	153	136	52	5	37	122
Town of Union	63	46	24	52	23	217	8,393	25.84	52.53	39.17	4	5	4	5	......	47	1	19	16	9	23	20	11	2	8	8	7	......	5	2
Mercer County.																														
Chambersburg	41	13	11	53	22	140	8,542	16.39	38.57	25.71	......	3	6	......	......	6	...	21	15	11	12	5	13	5	10	6	4	......	3	6
Trenton	160	65	60	174	133	601	34,386	17.48	37.44	22.80	2	11	9	1	4	22	1	87	57	31	42	47	40	25	54	41	15	......	5	32
Middlesex County.																														
New Brunswick	81	29	29	113	82	336	18,258	18.40	32.74	24.70	1	10	3	......	3	12	2	52	35	34	22	13	27	16	24	21	9	2	3	17
Morris County.																														
Morristown	22	10	7	54	34	128	8,760	14.61	25.00	23.44	2	2	3	......	1	7	1	14	10	13	7	1	14	9	16	10	4	......	4	......
Passaic County.																														
Passaic City	44	22	11	45	16	139	8,326	16.69	47.48	32.37	2	8	......	5	2	2	1	25	10	7	15	15	6	3	9	6	4	......	5	4
Paterson	384	184	86	393	220	1284	63,273	20.29	44.24	26.64	9	39	17	12	5	71	6	183	89	89	145	101	68	49	73	59	33	......	18	36
Salem County.																														
Salem City	24	15	9	27	30	106	5,516	19.22	36.79	21.70	1	3	......	......	......	6	...	13	7	9	10	10	5	2	12	4	5	1	1	8
Union County.																														
Elizabeth	181	127	67	207	112	697	32,119	21.70	44.19	28.69	12	10	13	12	10	62	1	80	53	36	72	65	41	18	55	27	10	1	8	23
Plainfield	39	10	7	43	41	141	8,913	15.82	34.75	21.28	1	3	1	......	......	3	...	22	13	7	19	8	10	10	15	4	3	......	1	4
Rahway	15	11	6	30	35	107	6,861	15.60	25.00	23.36	......	5	7	......	......	1	...	12	14	11	11	5	8	3	12	1	1	......	2	2
Warren County.																														
Phillipsburg	37	20	16	44	32	148	8,058	18.37	38.51	22.30	2	3	5	......	1	7	1	14	4	11	22	11	13	8	12	4	3	......	3	3
Total	3785	2361	1386	4650	2339	14,616	689,977	21.25	42.05	28.05	110	396	480	87	102	1061	44	1820	1091	989	1618	1240	840	534	921	623	289	17	176	511

*Small-pox column omitted; no deaths from this cause.

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

ATLANTIC COUNTY. Population, 22,356. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																				
	Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Absecon	1	3	......	5	3	12	567	....	......	......	......	......	......	......	......	......	2	......	5	......	......	1	......	1	1	......	......	......	......
Atlantic City	49	32	11	64	30	187	7,912	23.54	......	5	......	1	......	1	11	......	30	12	10	12	19	21	13	11	11	4	......	3	4
Buena Vista	6	1	2	3	......	12	1,016	....	......	1	......	......	......	......	1	......	2	1	1	......	1	1	......	......	......	......	......	......	1
Egg Harbor City	9	3	......	6	6	24	1,317	....	......	1	......	......	......	3	......	......	4	2	2	......	1	2	1	2	2	......	......	......	......
Egg Harbor Township	20	7	3	13	19	62	3,919	....	1	1	......	1	......	......	......	......	11	3	5	5	5	4	5	7	1	1	......	......	1
Galloway	3	4	3	16	17	43	2,153	....	......	4	......	1	......	......	1	......	3	4	4	5	2	1	1	7	1	2	1	1	1
Hamilton	10	5	6	8	6	35	1,484	....	......	5	......	......	2	......	3	......	7	1	3	3	2	......	2	3	......	1	......	......	......
Hammonton	9	6	1	8	21	45	2,525	....	......	1	......	......	......	3	1	......	7	3	3	4	......	2	7	1	5	1	......	......	......
Mullica	1	1	1	4	6	13	807	....	......	......	......	......	......	1	......	......	......	1	1	2	......	1	1	2	1	......	......	......	......
Weymouth	......	......	......	1	1	2	626	....	......	......	......	......	......	......	......	......	......	1	......	......	......	......	......	1	......	......	......	......	......
Totals	108	62	27	128	109	435	22,356	19.46	1	18	......	3	2	8	17	......	66	28	34	31	30	33	30	35	22	9	1	4	7

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

BERGEN COUNTY. Population, 39,880. Statistical Divisions.	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Englewood	18	8	7	22	21	76	4,429	......	......	......	......	1	1	......	......	......	11	6	4	13	4	10	1	6	4	......	1	3	3
Franklin	6	2	1	8	8	25	2,194	......	......	1	......	......	......	......	......	......	2	1	3	......	3	5	1	3	......	......	......	2	1
Harrington	11	1	3	4	16	35	2,604	......	......	2	......	......	......	1	1	......	6	......	......	2	4	5	6	3	......	2	......	......	1
Hohokus	12	5	3	9	14	43	2,898	......	1	......	......	......	......	1	4	......	7	1	1	5	2	4	2	4	3	2	......	......	1
Lodi	20	9	10	21	12	72	4,347	......	1	2	......	5	......	......	1	1	7	7	2	9	8	4	2	3	9	......	......	......	3
Midland	8	1	1	3	10	23	1,617	......	......	1	......	......	......	......	3	......	1	3	......	3	2	2	2	2	1	......	......	......	1
New Barbadoes	16	10	5	25	29	87	4,983	......	2	1	......	......	......	......	2	......	15	7	5	20	6	6	5	10	1	......	......	......	4
Palisade	2	2	6	6	7	24	2,333	......	......	1	......	......	1	1	3	......	1	......	1	2	......	4	4	2	1	......	......	......	......
Ridgefield	12	5	5	11	11	45	4,487	......	1	2	......	1	......	......	......	......	8	2	3	11	3	2	2	6	1	1	......	......	2
Ridgewood	5	2	4	16	14	41	1,776	......	1	1	......	......	......	......	......	......	4	5	9	2	......	6	1	7	1	1	......	......	......
Saddle River	2	3	......	5	9	20	1,584	......	2	......	......	......	......	......	1	......	3	......	2	2	......	1	2	1	......	1	......	......	1
Union	20	8	14	16	7	65	3,914	......	......	2	......	6	2	......	4	......	11	4	1	7	2	1	1	3	4	1	......	3	2
Washington	6	4	1	14	18	46	2,714	......	1	......	......	......	......	......	2	......	3	3	1	4	1	7	2	6	3	......	3	......	4
Totals	138	60	60	160	176	602	39,880	15.10	9	13	......	13	4	3	21	1	79	39	32	80	35	57	30	56	28	8	4	8	23

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

BURLINGTON COUNTY. POPULATION, 57,558. Statistical Divisions.	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Bass River	8	3		4	5	20	905								2		3		1	2	2	1		4				1	
Beverly	5	2	5	8	9	29	3,356		1			4			1	1	1	1	2	6	2	1	2	2	1	1			1
Bordentown	19	12	6	32	24	93	5,857	15.88		2		1			8		10	7	6	10	4	7	3	6	11	2			4
Burlington	39	16	16	59	54	188	7,690	24.45	1	4		2		2	8	1	11	9	14	25	18	11	4	18	18	5		3	9
Chester	7	7	7	11	17	51	3,071					2	1	1	5	1	7	2	4	2	2	5	4	2	4	2		1	1
Chesterfield	2		2	7	4	15	1,453										3	1	3	3		1		2					2
Cinnaminson	9	5	3	11	5	34	2,640		2	1					3		6	2	3		3	1	1	4	3			2	
Delran	11	10	1	8	9	39	1,932		1	1		5			3		7	2	1	3	3	2	2	6	1	1			
Eastampton	1			3		4	655										1	1	1					1					
Evesham	8	1	1	3	7	20	1,556		1	1					1		7		1	1	1			3	1				
Florence	3	5	4	5	5	22	1,682			1					1		3	1	2	4	2	2		1		2			1
Little Egg Harbor	8	3	3	5	11	30	1,885					1			5		3	2	1	1	2	2	1	4	1			1	
Lumberton				2	4	6	1,735											2				1	1	1					
Mansfield	4	1	5	6	14	30	1,715			1					4		1	3	2	7	1	1	1	5	1				
Medford	8	5	3	8	13	39	2,061			3		1			3		9	2	4	4		1	3	5	1				
Mount Laurel	2	3	3	3	4	15	1,781			2					2		1	1	1	2	1	1	2	1					
New Hanover	2	1	4	9	5	22	2,235			3		1					3	1	4		1	3			2				2
Northampton	23	5	11	39	34	112	5,006			3				1	2	1	9	9	9	9	7	6	9	13	3	7		4	7
Pemberton	4	4	5	16	16	45	2,914			4		1					4	3	4	8		3	1	9	2				2
Randolph	3			1	2	6	365										2		1	1	1			1					
Shamong	1	2	2	3	7	16	933			1		1					1			5		1	1	3	1				1
Southampton	7	2	3	6	10	29	2,263			1		2					5	2	3	3	1	2	1	1	1				1
Springfield	4	1	1	13	9	28	1,884			3						1	2	1	4	2	3	2		3	1	2			
Washington	1		1		1	3	328										1	1				1							
Westampton	1		1	4	2	8	688										1	1	1		2	1	1		1				
Willingboro	1	1		1	2	5	725			1										1		1		1					
Woodland	2			1		3	305							1			1							1					
Totals	143	89	87	268	273	912	57,558	15.84	6	32		21	1	5	48	5	102	54	72	99	56	57	87	97	53	22		12	81

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

CAMDEN COUNTY. Population, 76,685. Statistical Divisions.	DEATHS AT ALL AGES.								PRINCIPAL CAUSES OF DEATH.																				
	Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Camden	283	121	111	287	162	968	52,884	18.30	8	43	......	27	2	6	53	......	136	67	89	88	83	56	28	71	26	11	......	11	30
Centre	10	2	2	4	8	27	1,723	......	......	1	......	......	......	......	2	......	4	1	1	7	2	2	......	......	1	......	......	......	1
Delaware	7	1	1	6	3	18	1,572	......	......	1	......	......	......	1	1	......	4	......	1	4	......	1	1	......	1	......	......	......	1
Gloucester City	23	12	8	32	17	92	5,966	15.42	......	1	......	......	......	......	7	......	10	7	14	6	8	5	2	7	7	2	......	......	8
Gloucester	12	6	4	16	24	64	2,512	......	1	5	......	......	......	......	......	......	10	2	7	6	3	6	1	12	4	2	......	......	2
Haddon	6	9	3	17	18	53	3,270	......	......	4	......	1	......	......	3	1	4	2	2	4	1	7	1	8	1	2	......	2	2
Stockton	31	10	9	25	19	94	4,450	......	......	6	......	......	......	2	4	......	16	6	4	9	4	10	2	4	5	1	......	2	6
Waterford	7	6	......	4	12	29	2,098	......	......	1	......	1	......	2	......	......	4	1	1	3	1	2	2	1	2	......	......	......	2
Winslow	8	3	......	7	7	25	2,180	......	......	1	......	......	......	......	......	......	8	1	2	......	2	1	1	3	2	2	......	......	......
Totals	387	170	138	398	270	1,370	76,685	17.87	9	63	......	29	2	11	70	1	196	87	121	127	104	90	38	106	49	20	......	15	52

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

CAPE MAY COUNTY. Population, 10,744. Statistical Divisions.	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal	Accident.
Cape May City	9	2	......	5	7	24	1,610	....	.....	......	......	......	......	......	......	......	2	......	1	3	1	1	......	4	2	2	......	......	1
Dennis	9	4	2	10	11	36	2,328	....	.....	1	......	3	1	1	......	......	5	2	2	2	2	2	....	9	1	2	......	......	1
Lower	10	2	5	9	9	35	2,026	....	......	6	......	......	......	......	......	......	9	2	1	1	1	3	......	6	1	1	......	......	......
Middle	7	4	1	6	17	35	2,605	....	.....	......	......	......	......	1	1	......	4	1	3	5	1	1	1	9	2	1	......	1	......
Upper	9	1	1	7	13	31	2,175	....	1	1	......	1	......	1	......	......	......	4	1	5	2	2	1	2	4	......	......	......	......
Totals	44	13	9	37	57	161	10,744	14.99	1	8	......	4	1	3	1	.....	20	9	8	16	7	9	2	30	10	6	......	1	2

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

CUMBERLAND COUNTY. POPULATION, 41,982. Statistical Divisions.	DEATHS AT ALL AGES.								PRINCIPAL CAUSES OF DEATH.																				
	Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Bridgeton	46	27	13	47	42	179	10,065	17.78	1	3	.....	.....	.....	2	2	1	26	15	12	21	19	10	8	11	14	1	.....	1	7
Commercial	11	6	1	6	7	31	2,544	....	1	2	.....	.....	.....	.....	1	2	1	.....	4	1	5	2	.....	1	.....	1	.....	1	2
Deerfield	6	.....	1	3	6	16	1,632	....	.....	1	.....	.....	.....	.....	1	.....	4	.....	1	1	.....	2	.....	3	.....	.....	.....	.....	.....
Downe	5	1	1	7	5	19	1,860	....	1	1	.....	.....	.....	.....	.....	.....	3	2	3	.....	1	2	1	2	1	.....	.....	.....	.....
Fairfield	8	8	8	6	11	41	1,612	....	.....	.....	.....	.....	.....	.....	14	.....	4	.....	4	2	2	1	1	2	.....	1	.....	.....	1
Greenwich	8	3	3	2	12	28	1,267	....	.....	.....	.....	.....	.....	1	1	.....	3	.....	2	1	3	3	.....	4	1	.....	.....	1	.....
Hopewell	6	1	1	6	17	31	1,794	....	.....	.....	.....	.....	.....	.....	1	.....	4	5	1	1	1	.....	3	8	.....	1	.....	.....	.....
Landis	25	12	14	40	36	127	7,021	....	1	2	.....	15	.....	1	1	.....	7	7	18	7	13	12	3	12	4	4	.....	2	3
Lawrence	2	1	1	2	6	12	1,728	....	.....	1	.....	.....	.....	.....	.....	.....	2	2	.....	.....	1	2	.....	.....	3	.....	.....	.....	.....
Maurice River	9	8	3	9	9	41	2,562	....	.....	.....	.....	5	.....	.....	3	.....	6	1	5	4	3	2	3	2	2	.....	.....	.....	2
Millville	43	21	12	39	31	149	8,824	16.89	2	4	.....	1	.....	3	3	2	31	13	17	15	8	12	5	6	5	3	.....	.....	5
Stoe Creek	.....	1	1	5	4	11	1,073	....	.....	.....	.....	.....	.....	.....	.....	.....	2	1	.....	2	.....	1	2	1	.....	1	.....	.....	.....
Totals	169	89	59	172	189	685	41,982	16.32	6	14	.....	21	.....	7	27	5	93	46	67	55	56	49	26	52	30	12	.....	5	20

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

ESSEX COUNTY. Population, 213,764. Statistical Divisions.	DEATHS AT ALL AGES.								PRINCIPAL CAUSES OF DEATH.																				
	Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Belleville	17	7	10	11	9	55	3,285			1					4		7	2	6	6	8	3	2	7	2				2
Bloomfield	20	12	11	28	25	98	6,502			3				1	10		13	6	4	13	3	8	3	11	4	2		2	3
Caldwell	4	7	8	12	18	50	3,336		4	1					5		4	1	3	4	3	8	1	8	3	2			2
Clinton	8	2	3	10	14	37	2,830								1		2	5	2	2	3	5	1	5		2	1		1
East Orange	22	17	12	48	40	141	10,328		3	3			1	2	11		10	15	5	22	3	17	7	8	6	7		1	4
Franklin	4			2	5	11	1,602										2		2	1		2	2		1	1			
Livingston	2		1	5	16	24	1,275											2		4		2	2	4	2	3			1
Milburn	10	8	6	8	15	47	2,023								11		6	3	3	2	1	6	3	5	3				1
Montclair	15	8	17	17	13	70	6,327			2		1			9	1	8	2	2	4	9	7	3	5	5	3			
Newark	885	658	385	1210	572	3,729	152,988	24 38	31	94		68	16	21	438	8	443	307	258	410	302	203	129	250	151	80	4	42	117
Orange	76	45	33	105	41	300	15,231	19 70		5		4			32	3	34	25	19	38	29	17	21	9	10	7		6	9
South Orange	12	7	7	11	8	45	4,225			1		2			5	1	6	3	5	4	2	3	3	3	1				
West Orange	11	8	4	12	20	55	3,812					3			3	1	5	7	4	9	1	2	1	2	1	4		1	2
Totals	1086	779	497	1479	796	4,662	213,764	21 81	38	110		78	17	24	529	14	540	378	313	519	364	293	178	317	189	111	5	52	142

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

GLOUCESTER COUNTY. Population, 27,603. Statistical Divisions.	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Clayton	5	8	4	11	14	42	2,399	......	1	3	......	2	......	1	2	......	6	4	4	2	1	3	......	6	1	3	......	......	......
Deptford	2	6	3	3	12	26	1,744	......	......	......	......	1	......	1	......	......	1	......	......	3	5	4	2	1	......	......	......	......	1
East Greenwich	4	3	3	3	11	24	1,233	......	......	1	......	2	......	......	......	......	3	......	......	3	1	2	2	4	1	......	......	......	2
Franklin	13	13	4	8	16	54	2,362	......	1	1	......	......	......	......	......	......	17	3	6	7	4	3	2	2	4	......	......	......	3
Glassboro	11	4	5	11	7	39	2,377	......	......	1	......	......	......	......	2	......	8	4	2	5	2	1	......	3	......	......	......	......	2
Greenwich	12	2	3	13	12	43	1,729	......	......	......	......	......	......	1	......	......	7	2	4	2	2	1	3	8	3	......	1	......	3
Harrison	4	5	1	6	16	32	1,637	......	......	......	......	1	......	1	1	......	2	4	3	3	3	1	2	1	5	1	......	1	3
Logan	6	1	1	7	9	24	1,653	......	......	......	......	......	......	......	......	......	4	1	3	1	1	1	......	4	5	......	......	......	......
Mantua	2	3	......	8	9	22	1,624	......	......	......	......	......	......	......	1	......	1	......	4	1	1	2	......	1	......	1	......	......	2
Monroe	5	7	6	7	10	37	1,950	......	......	3	......	......	......	......	......	......	10	6	1	1	4	2	1	1	3	......	......	1	2
South Harrison	......	1	......	1	3	5	1,001	......	......	......	......	......	......	......	......	......	1	......	1	1	......	......	......	......	1	......	1	......	......
Washington	5	1	1	5	5	17	1,265	......	......	1	......	1	......	1	......	......	2	1	3	2	......	1	1	2	1	......	......	......	......
West Deptford	3	1	4	3	2	13	1,305	......	2	......	......	......	......	......	2	......	......	......	2	2	......	......	......	......	......	......	1	1	1
Woodbury	17	7	4	8	15	51	3,278	......	......	1	......	1	......	......	2	......	11	3	6	2	6	1	3	6	2	1	......	......	......
Woolwich	4	3	6	8	10	32	2,046	......	1	......	......	2	......	......	......	......	4	4	1	3	3	3	1	3	2	1	......	......	......
Totals	93	65	45	102	151	461	27,603	16.70	5	11	......	10	......	5	10	......	77	32	40	38	33	25	17	42	28	7	3	3	19

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

HUDSON COUNTY. POPULATION, 240,342. Statistical Divisions.	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Bayonne	78	42	12	76	31	243	13,080	18.58	3	8	.....	4	1	2	15	1	27	13	12	29	32	14	5	14	7	3	.....	4	19
Guttenberg	13	5	3	10	2	33	1,615	.....	.....	1	.....	2	.....	.....	1	.....	7	1	2	4	4	1	.....	1	.....	1	.....	2	.....
Harrison	42	23	20	56	17	159	6,806	23.36	1	4	.....	.....	.....	.....	18	.....	20	15	12	20	20	5	4	12	4	2	.....	2	7
Hoboken	237	127	60	310	109	843	37,721	22.35	3	21	.....	10	5	7	47	4	125	62	58	85	81	53	39	53	32	19	4	9	38
Jersey City	869	673	373	1099	423	3,442	153,513	22 42	24	100	.....	291	28	32	173	10	375	216	200	459	313	170	123	153	136	52	5	37	122
Kearny	15	14	2	10	4	46	3,338	.....	3	1	.....	.....	.....	.....	8	.....	5	3	1	2	8	.....	.....	2	1	.....	.....	1	5
North Bergen	42	15	10	97	60	225	5,459	.....	2	3	2	1	.....	1	7	.....	13	37	16	13	12	11	19	24	11	2	.....	1	11
Town of Union	68	46	28	52	23	217	8,398	25.84	4	5	.....	4	5	.....	47	1	19	16	9	23	20	11	2	8	8	7	.....	5	2
Union	14	9	5	6	3	37	1,781	.....	.....	.....	.....	1	.....	.....	8	.....	4	1	2	4	5	1	.....	.....	2	.....	.....	.....	1
Weehawken	6	5	5	14	6	36	1,469	.....	.....	1	.....	2	.....	.....	1	.....	4	3	1	4	3	2	1	2	1	.....	1	.....	8
West Hoboken	47	23	11	31	16	128	7,162	.....	4	.....	.....	1	.....	1	15	.....	21	8	1	24	13	5	5	8	4	2	.....	1	1
Totals	1431	982	529	1761	697	5,409	240,342	22.51	44	144	2	319	39	43	340	16	620	375	314	667	514	273	198	277	206	88	10	62	214

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

HUNTERDON COUNTY. Population, 37,420. Statistical Divisions.	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Alexandria	4	1	....	5	8	18	1,235	....	....	....	....	....	....	....	....	....	3	1	....	1	1	3	1	4	1	1	....	....	....
Bethlehem	5	1	2	10	15	33	2,780	....	....	....	....	....	....	....	....	....	4	1	4	2	3	....	....	2	4	....	....	1	....
Clinton	8	9	1	12	13	43	2,900	....	1	1	....	....	....	....	6	....	2	4	5	3	3	....	1	5	4	....	....	1	2
Delaware	6	8	....	17	18	43	3,092	....	....	1	....	1	....	....	....	....	1	7	5	1	1	2	1	8	2	2	....	....	2
East Amwell	2	....	2	3	7	14	1,549	....	....	....	....	....	....	....	....	....	....	1	2	....	....	3	2	1	2	1	....	....	....
Franklin	1	1	1	5	9	17	1,387	....	....	2	....	1	....	....	....	2	1	1	3	1	....	2	....	2	1	....	....	....	....
Frenchtown	2	1	1	2	5	11	1,066	....	....	....	....	....	....	....	....	....	3	....	1	1	1	....	1	1	3	....	....	....	....
High Bridge	3	4	5	11	6	29	2,024	....	....	1	....	....	....	....	3	....	1	5	4	4	3	1	....	2	2	1	....	....	1
Holland	2	....	1	5	11	19	1,867	....	1	....	....	....	....	....	....	....	1	1	....	2	1	3	2	4	2	....	....	....	1
Kingwood	....	3	1	7	9	20	1,482	....	....	....	....	1	....	....	1	1	1	2	2	1	3	3	2	....	....	....	....	....	2
Lambertville	9	8	5	18	27	67	4,067	....	....	....	....	4	....	....	1	....	4	9	9	5	3	4	2	11	3	....	....	....	3
Lebanon	3	4	3	14	20	44	2,816	....	....	3	....	1	....	....	3	1	....	....	6	1	4	7	2	7	2	2	....	2	1
Raritan	3	1	....	6	8	19	3,978	....	....	....	....	....	....	....	....	....	2	3	1	....	....	5	....	2	....	....	....	....	2
Readington	6	....	3	11	13	35	2,940	....	....	....	....	....	....	....	1	....	1	4	6	1	4	6	1	4	1	1	....	....	2
Tewksbury	6	4	2	9	14	35	2,081	....	1	1	....	....	....	....	3	....	3	2	3	2	2	4	1	3	3	2	....	....	....
Union	1	1	1	....	4	7	1,195	....	....	....	....	....	....	....	1	....	....	....	....	....	1	1	....	3	....	....	....	....	....
West Amwell	3	1	1	4	3	12	960	....	....	4	....	....	....	....	....	....	....	1	2	1	....	1	....	....	....	....	....	....	1
Totals	64	47	29	139	190	466	37,420	12.45	3	13	....	8	....	....	19	4	27	42	53	26	30	45	16	59	30	10	....	4	17

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

MERCER COUNTY. Population, 66,785. Statistical Divisions.	DEATHS AT ALL AGES.								PRINCIPAL CAUSES OF DEATH.																				
	Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined	Population, census of 1885.	Death-rate per 1,000.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases	Brain and nervous diseases of children	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Chambersburg	41	13	11	52	22	140	8,542	16.39	......	3	......	6	......	......	6	......	21	15	11	12	5	13	5	10	6	4	......	3	6
East Windsor	6	2	2	11	13	35	2,568	......	......	1	......	......	......	......	......	2	2	......	1	3	2	3	1	7	4	1	......	......	1
Ewing	3	1	2	41	39	81	2,489	......	......	4	......	......	......	1	......	......	2	2	8	2	......	4	1	40	6	......	......	......	4
Hamilton	6	2	3	11	15	37	3,420	......	......	2	......	......	......	......	1	......	4	3	......	3	1	4	......	5	6	1	......	......	3
Hopewell	6	2	4	11	26	54	4,367	......	1	......	......	......	......	3	1	......	1	4	5	7	2	1	1	13	6	1	1	......	1
Lawrence	5	2	4	7	7	25	1,589	......	......	2	......	......	......	1	1	......	3	......	2	2	2	3	1	2	1	1	......	......	4
Millham	8	4	4	7	5	29	2,338	......	1	1	......	......	......	2	......	......	5	4	2	3	2	......	1	3	......	......	......	......	......
Princeton	24	24	13	24	31	116	4,577	......	3	2	......	1	......	4	27	......	9	9	1	13	2	7	6	9	5	4	......	......	2
Trenton	160	65	50	174	133	601	34,386	17.48	2	11	......	9	1	4	22	1	87	57	31	42	47	40	25	54	41	15	......	5	32
Washington	2	1	3	10	10	26	1,196	......	......	1	......	......	......	......	......	......	2	2	4	1	1	4	2	4	5	......	......	......	......
West Windsor	1	1	1	4	11	19	1,313	......	1	1	......	1	......	......	1	......	......	1	......	2	......	1	2	4	......	......	......	......	1
Totals	262	117	97	322	312	1,163	66,785	17.41	8	28	......	17	1	15	59	3	136	97	65	90	64	80	45	151	80	27	1	8	54

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

MIDDLESEX COUNTY. Population, 56,180. Statistical Divisions.	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Cranbury	7	3	5	8	11	35	1,569	......	......	......	......	3	3	....	2	....	5	2	2	4	1	1	2	3	3	......	......	......	2
East Brunswick	12	9	8	9	14	52	3,697	......	1	2	......	2	1	3	1	....	13	2	1	1	......	4	3	3	1	2	....	2	1
Madison	1	4	......	1	7	13	1,519	......	....	......	......	......	......	1	......	......	3	......	......	2	1	3	1	......	1	......	1	......	......
Monroe	6	1	2	7	14	31	3,199	......	......	......	......	......	......	1	......	2	2	4	2	5	......	2	2	4	......	1	......	......	2
New Brunswick	81	29	29	113	82	336	18,258	18 40	1	10	......	3	......	3	12	2	52	35	34	22	13	27	16	24	21	9	2	3	17
North Brunswick	3	3	4	9	6	26	1,272	......	......	......	......	1	......	......	1	......	3	3	1	3	2	2	......	4	......	2	......	1	1
Perth Amboy	57	44	12	41	20	165	6,311	......	2	3	......	20	1	7	3	......	19	9	10	6	22	7	7	8	3	......	1	3	10
Piscataway	6	1	3	13	15	40	3,155	......	......	3	......	......	......	......	......	......	5	2	1	4	1	4	6	5	2	......	......	1	1
Raritan	11	3	1	11	16	47	3,656	......	......	......	......	......	......	....	......	......	8	1	3	1	1	3	2	7	4	2	......	......	4
Sayreville	5	6	3	3	3	20	2,549	......	......	1	......	......	1	1	1	......	5	3	......	1	1	......	......	......	3	......	......	......	1
South Amboy	19	17	4	21	8	69	4,054	......	1	1	....	3	......	4	4	1	6	3	3	10	6	1	......	6	6	1	......	1	4
South Brunswick	9	5	7	12	10	47	2,714	......	1	1	......	......	1	......	5	......	7	3	3	2	......	4	2	2	1	5	......	1	3
Woodbridge	19	6	6	13	19	64	4,227	......	1	2	......	1	......	......	......	......	11	7	3	7	6	5	4	6	......	1	......	......	2
Totals	236	131	81	261	225	946	56,180	16 84	7	23	......	33	7	20	29	5	139	74	63	68	54	63	45	72	50	23	4	12	48

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

MONMOUTH COUNTY. POPULATION, 62,324. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																				
	Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Atlantic	3	1	2	12	6	24	1,656	......	......	1	......	......	......	......	......	......	1	2	2	3	2	......	3	2	2	2	......	......	1
Eatontown	5	3	4	11	16	39	2,812	......	......	......	......	......	......	......	......	......	2	7	2	4	3	......	3	4	4	2	1	2	......
Freehold	15	23	9	27	25	100	4,494	......	1	......	......	......	7	......	9	......	14	6	7	9	8	12	1	11	6	1	......	......	1
Holmdel	4	7	1	4	11	27	1,640	......	......	......	......	......	......	......	......	......	10	1	4	2	1	......	1	2	2	1	......	......	......
Howell	7	6	2	11	12	38	3,308	......	1	......	......	......	2	......	......	......	3	2	2	7	1	3	2	2	6	......	......	......	2
Manalapan	5	8	2	8	10	33	2,143	......	......	......	......	......	1	......	3	......	1	1	4	5	4	3	1	3	3	......	......	......	2
Marlboro	5	3	2	8	11	29	2,089	......	......	......	......	2	1	......	1	......	......	1	......	2	5	2	1	2	6	2	. .	......	......
Matawan	14	3	5	12	13	47	2,756	......	......	......	......	......	......	......	2	......	2	6	4	11	7	5	5	......	2	......	......	......	......
Middletown	24	15	9	26	25	100	5,802	......	5	3	......	......	3	2	3	1	8	7	4	13	10	5	3	7	7	2	......	......	2
Millstone	4	......	2	6	10	22	1,917	......	......	2	......	......	1	......	1	......	1	1	1	2	......	2	1	1	2	......	......	1	1
Neptune	39	9	13	29	31	122	6,421	......	5	3	......	1	......	2	2	......	22	4	9	14	7	12	2	6	10	1	1	......	1
Ocean	30	20	10	37	23	126	7,640	......	2	......	......	......	1	......	9	......	14	5	5	12	8	7	11	9	10	3	1	1	12
Raritan	23	7	7	26	31	94	4,238	......	2	4	......	2	1	......	5	1	10	4	8	10	1	5	6	11	5	1	......	1	3
Shrewsbury	30	15	10	38	37	132	7,558	......	......	5	......	2	1	......	3	......	21	9	9	22	5	9	7	18	4	1	......	1	6
Upper Freehold	9	5	4	9	23	51	3,130	......	......	......	......	......	......	......	1	1	1	2	4	9	5	1	1	9	2	......	......	......	2
Wall	21	16	8	18	18	81	4,820	......	1	2	......	......	4	......	......	......	9	2	7	11	5	4	2	6	4	1	......	1	7
Totals	238	141	90	282	302	1,065	62,324	17 09	17	20	......	7	22	4	39	3	119	60	72	136	72	70	50	93	75	17	8	7	40

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

MORRIS COUNTY. Population, 50,675. Statistical Divisions	DEATHS AT ALL AGES. Under one year	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Boonton	9	4	3	21	16	53	2,782	......	......	1	......	......	......	1	3	......	5	6	4	5	......	1	4	6	3	4	......	1	5
Chatham	13	6	8	23	20	71	4,291	......	......	......	......	1	......	......	6	......	4	8	7	13	4	4	5	5	4	2	......	......	......
Chester	5	3	2	17	10	38	2,510	......	1	2	......	2	......	......	......	......	6	2	4	4	2	......	2	3	3	3	......	......	1
Hanover	10	4	6	48	44	110	4,459	......	2	......	......	2	......	......	1	......	3	5	5	10	3	8	3	49	6	......	......	1	......
Jefferson	5	3	2	4	7	21	1,559	......	......	......	......	......	......	......	......	......	2	......	2	3	2	2	......	2	......	......	......	......	2
Mendham	2	......	1	4	15	22	1,431	......	......	......	......	......	......	......	......	......	......	......	5	3	3	4	......	1	5	......	......	......	1
Montville	1	1	2	3	7	14	1,225	......	......	......	......	......	......	......	2	......	......	1	1	2	......	3	3	1	......	1	......	......	......
Morristown	22	10	7	54	34	128	8,760	14.61	2	2	......	3	......	1	7	1	14	10	13	7	1	14	9	16	10	4	......	4	......
Mt. Olive	2	4	4	10	11	31	2,005	......	......	3	......	......	......	1	......	......	3	4	1	3	3	4	2	2	1	1	......	1	......
Passaic	5	......	......	4	11	20	1,716	......	......	......	......	......	......	......	......	......	1	4	2	4	......	......	3	......	3	......	......	......	......
Pequannock	11	2	6	13	13	45	2,625	......	......	1	......	2	......	......	1	......	3	5	1	3	1	5	3	5	3	1	......	2	......
Randolph	28	8	12	31	27	107	7,045	......	......	3	......	1	......	......	2	......	12	6	7	8	11	7	5	12	7	2	1	4	4
Rockaway	16	15	11	30	26	98	5,573	......	......	4	......	7	......	......	9	......	7	7	10	15	6	3	3	6	6	2	......	3	2
Roxbury	11	7	1	2	5	27	2,184	......	1	......	......	......	......	2	......	1	9	......	......	......	3	2	......	1	1	......	......	......	3
Washington	4	3	2	2	12	23	2,560	......	......	1	......	......	......	......	3	......	2	......	2	3	......	2	1	6	1	......	......	......	......
Totals	144	70	67	266	258	808	50,675	15.94	6	17	......	18	......	5	34	2	71	58	64	83	39	59	43	115	53	20	1	16	18

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

OCEAN COUNTY. Population, 15,586. Statistical Divisions.	DEATHS AT ALL AGES.								PRINCIPAL CAUSES OF DEATH.																				
	Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Berkeley	6	3	.....	7	4	20	714	.....	.....	1	.....	.....	.....	.....	1	.....	5	.....	1	2	2	2	.....	3	1	1	.....	.....	.....
Brick	17	12	2	22	17	71	3,794	.....	2	2	.....	.....	1	.....	5	.....	7	3	5	15	3	2	6	8	2	.....	.....	1	3
Dover	5	5	4	14	13	41	2,591	.....	.....	1	.....	.....	.....	.....	.....	.....	3	4	6	5	4	1	2	6	4	1	.....	.....	2
Eaglewood	4	2	.....	4	7	17	681	.....	.....	1	.....	.....	.....	.....	.....	.....	3	.....	3	2	1	.....	1	3	.....	.....	.....	.....	.....
Jackson	.....	1	5	3	10	20	1,763	.....	.....	1	.....	.....	4	.....	1	.....	.....	2	.....	3	.....	.....	.....	4	2	1	.....	.....	.....
Lacey	2	3	.....	4	10	19	746	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	1	2	4	2	1	2	2	.....	1	.....	.....	1
Manchester	1	4	.....	3	2	10	1,098	.....	.....	.....	.....	.....	2	.....	.....	.....	2	1	1	1	.....	1	.....	1	.....	.....	.....	.....	1
Ocean	.....	.....	.....	4	3	8	541	.....	.....	.....	.....	.....	1	.....	1	.....	.....	1	4	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Plumstead	5	2	2	7	15	31	1,546	.....	.....	2	.....	.....	.....	.....	.....	.....	2	1	4	.....	1	2	1	4	6	.....	.....	1	.....
Stafford	2	1	.....	6	6	15	1,026	.....	.....	1	.....	.....	.....	.....	.....	.....	2	3	.....	.....	.....	2	1	2	1	.....	.....	.....	.....
Union	2	4	1	4	3	16	1,083	.....	.....	.....	.....	.....	1	.....	.....	.....	3	2	2	.....	1	1	.....	2	.....	.....	.....	1	.....
Totals	44	37	14	78	90	268	15,586	17.19	2	9	.....	.....	9	.....	8	.....	29	18	28	32	14	12	13	36	16	4	.....	3	7

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

PASSAIC COUNTY. Population, 83,374. Statistical Divisions.	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Acquackanonk	10	2	2	10	6	30	2,038	......	1	1	......	......	......	......	2	......	5	......	4	5	2	......	1	2	......	2	......	......	1
Little Falls	8	3	3	11	8	33	1,701	......	3	......	......	......	......	......	1	......	2	1	2	3	3	2	3	1	4	......	......	......	3
Manchester	7	1	......	8	6	22	1,639	......	1	1	......	......	......	......	1	......	4	1	1	2	2	......	1	2	3	1	......	......	......
Passaic	44	22	11	45	16	139	8,326	16.69	2	8	......	......	5	2	2	1	25	10	7	15	15	6	3	9	6	4	......	5	4
Paterson	384	184	86	393	220	1,284	63,273	20.29	9	39	......	17	12	5	71	6	183	89	89	145	101	68	49	73	59	33	......	18	36
Pompton	13	2	4	9	9	38	2,109	......	......	......	......	......	......	......	2	......	3	1	......	6	3	6	2	3	3	1	......	......	......
Wayne	2	3	1	3	5	14	1,866	......	1	......	......	......	......	......	3	......	1	1	1	1	1	1	1	2	......	......	......	......	1
West Milford	10	4	3	10	11	38	2,422	......	......	1	......	......	......	......	4	......	1	......	3	4	2	6	......	9	1	1	......	......	......
Totals	478	221	110	449	281	1,598	83,374	19.17	17	50	......	17	17	7	86	7	244	103	107	181	129	89	60	101	76	42	......	23	45

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

SALEM COUNTY. Population, 25,373. Statistical Divisions.	Deaths at all ages. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	Principal causes of death. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Alloways.	2	3	2	4	6	19	1,749	......	......	1	......	......	......	......	1	......	2	......	3	3	......	......	2	2	......	1	......	......	1
Elsinboro	1	......	......	2	1	4	571	......	......	......	......	......	......	......	......	......	......	1	1	......	1	......	......	1	......	......	......	......	......
Lower Alloways Creek	3	1	3	2	8	18	1,365	......	1	1	......	1	......	......	1	......	1	......	1	1	1	1	2	1	2	......	......	......	1
Lower Penns Neck	4	1	4	8	5	23	1,408	......	......	4	......	1	......	......	......	......	1	3	5	......	......	......	1	1	1	......	......	1	......
Mannington	9	4	4	8	12	38	2,161	......	......	1	......	......	......	......	......	......	3	3	4	4	3	1	2	5	1	......	......	......	......
Oldmans	3	2	......	4	8	18	1,463	......	......	1	......	......	......	......	......	......	2	......	2	......	2	2	......	2	1	......	......	......	......
Pilesgrove	13	3	4	19	15	54	3,397	......	......	5	......	......	......	......	3	......	8	3	5	5	3	2	......	6	4	2	......	1	1
Pittsgrove	6	1	1	5	6	19	2,135	......	......	1	......	1	......	......	......	......	4	......	......	1	......	2	1	......	......	1	......	......	2
Quinton	5	......	2	1	5	13	1,460	......	......	1	......	1	......	......	......	......	......	2	......	2	......	2	......	......	......	......	......	......	......
Salem	24	15	9	27	30	106	5,516	19.22	1	3	......	......	......	......	6	......	13	7	9	10	10	5	2	12	4	5	1	1	3
Upper Penns Neck	8	2	1	7	7	25	2,216	......	1	......	......	......	......	......	1	......	6	2	2	1	1	2	1	2	2	1	......	......	......
Upper Pittsgrove	3	1	1	1	6	12	1,932	......	......	1	......	......	......	1	......	......	1	1	......	2	2	1	......	1	......	......	......	......	......
Totals	81	33	31	88	109	349	25,373	13.75	3	19	......	4	......	1	12	......	41	22	32	29	23	18	11	33	15	10	1	3	8

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

SOMERSET COUNTY. Population, 27,425. Statistical Divisions.	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Bedminster	2	2	4	5	11	24	1,769	....	......	......	.....	......	......	......	5	......	......	2	1	3	......	2	1	5	1	......	......	......	2
Bernards	3	2	6	6	19	36	2,504	....	1	1	.....	1	.....	.....	1	2	4	2	1	2	3	2	......	6	4	......	......	1	1
Branchburg	......	1	2	8	8	19	1,177	....	......	....	.....	......	......	.....	......	......	......	......	6	1	1	4	2	2	1	.....	......	......	2
Bridgewater	29	16	17	48	83	143	8,454	....	2	3	.....	2	......	2	15	......	12	6	14	14	7	6	6	17	5	5	......	2	9
Franklin	13	6	4	11	16	50	3,720	....	2	......	.....	......	......	1	6	......	8	......	3	4	1	4	3	5	3	2	......	......	2
Hillsborough	8	4	3	9	17	41	3,151	....	1	1	.....	.....	.....	1	1	......	6	2	2	4	4	4	1	4	2	1	......	......	1
Montgomery	7	1	4	10	13	35	1,800	....	......	.....	.....	.....	......	1	......	......	......	1	2	8	1	3	3	5	2	1	......	......	1
North Plainfield	12	3	5	22	10	52	3,728	....	......	1	.....	2	.....	......	......	......	7	3	4	8	2	4	3	1	3	2	......	......	5
Warren	7	.....	1	4	6	18	1,122	....	......	......	.....	.....	.....	....	2	......	2	......	1	1	......	......	......	1	2	4	......	......	2
Totals	81	35	46	123	133	418	27,425	15 24	6	6	.....	5	.....	5	30	2	39	16	34	45	19	29	19	46	23	15	......	3	25

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

SUSSEX COUNTY. Population, 22,401. Statistical Divisions.	DEATHS AT ALL AGES.						Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH.																				
	Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.			Remittent fever, etc.	Typhoid.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Andover	4	1	1	4	5	15	1,014	......	......	......	......	......	......	......	......	......	3	......	1	1	......	2	......	3	1	1	......	1	1
Byram	6	4	......	9	9	28	1,242	......	......	1	......	......	......	......	1	1	1	4	2	3	3	3	2	1	1	1	......	1	......
Frankford	6	1	1	3	13	24	1,495	......	......	......	......	......	......	1	......	......	......	......	4	5	1	2	......	4	......	1	......	......	......
Greene	1	......	2	6	5	14	704	......	......	......	......	......	......	......	1	......	......	3	2	......	......	3	......	......	1	......	......	2	1
Hardyston	6	3	6	11	5	31	2,500	......	......	1	......	......	......	......	3	......	2	3	2	8	5	1	......	12	2	......	......	......	1
Hampton	......	......	1	4	3	8	938	......	......	1	......	......	......	......	......	......	......	1	1	3	......	2	......	......	......	......	......	......	......
Lafayette	......	1	......	6	3	11	816	......	......	......	......	......	......	......	......	......	......	......	1	1	1	3	......	1	1	3	......	......	......
Montague	1	1	2	2	1	7	900	......	......	......	......	......	......	......	......	......	1	......	......	1	1	1	......	......	1	1	......	......	......
Newton	3	4	10	15	13	46	2,648	......	......	3	......	......	......	......	8	......	3	5	6	2	2	4	......	6	4	1	1	......	1
Sandyston	2	1	1	3	7	15	1,092	......	......	......	......	......	......	......	2	......	......	1	2	1	1	2	2	2	1	......	......	......	......
Sparta	9	5	6	9	10	35	1,901	......	......	1	......	......	......	......	......	......	6	2	2	7	3	1	2	3	2	......	......	......	1
Stillwater	3	2	......	6	8	19	1,366	......	1	......	......	......	......	......	1	......	1	3	......	4	......	2	1	2	......	......	......	......	1
Vernon	6	3	2	3	9	23	1,855	......	......	......	......	......	......	1	......	......	......	1	......	3	3	4	......	......	......	......	......	......	1
Walpack	2	......	1	2	1	6	553	......	......	......	......	......	......	......	......	......	2	1	......	1	2	......	......	......	......	......	......	......	......
Wantage	3	3	2	10	22	42	3,377	......	2	......	......	......	......	......	......	......	3	3	2	5	......	2	3	6	3	1	......	2	4
Totals	52	29	35	98	114	324	22,401	14.46	3	7	......	......	......	2	16	1	22	27	25	45	22	32	10	30	18	9	1	6	11

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

UNION COUNTY. Population, 61 839. Satistical Divisions.	DEATHS AT ALL AGES. Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH. Remittent fever, etc.	Typhoid fever	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal diseases	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Clark				1	2	8	863																1	1					
Cranford	3	3	4	9	3	22	1,251					1	1		3					3	1	3	1	2	1	2			
Elizabeth	181	127	67	207	112	697	32,119	21.70	12	10		13	12	10	62	1	80	53	36	72	65	41	18	55	27	10	1	8	23
Fanwood	1	5	3	4	6	19	1,210					2			3		1		2		1	3	1		1				1
Linden	7	5	8	8	5	28	1,971					2			1		6		3	5	1	1	1	2	1				4
New Providence				6	8	14	824												2	1		2		4	2	1			
Plainfield	39	10	7	43	41	141	8,913	15.82	1	3		1			3		22	13	7	19	8	10	10	15	4	3		1	4
Rahway	15	11	16	30	35	107	6,851	15.60		5		7			1		12	14	11	11	5	8	3	12	1	1		2	2
Springfield	6	3	1	3	4	17	847					1			1		1	2	1	1	4	2	1	1					1
Summit	7	4	1	10	5	27	2,539							1			5	4	1	3	1	1	1	1	3				
Union	12	8	7	6	22	55	2,589			2					9		3		2	5	6	5	3	5	5	2	1		
Westfield	5	1	5	6	17	35	2,352			2							3	1	3	7	1	3		3	2	5			
Totals	276	177	114	333	260	1,165	61,839	18.84	13	22		27	13	11	85	1	133	87	68	127	93	79	40	101	47	24	2	11	35

Return of Deaths from all Causes and Certain Specified Diseases, in the Statistical Divisions of the State of New Jersey, for the Year ending June 30th, 1885.

WARREN COUNTY. Population, 37,737. Statistical Divisions.	DEATHS AT ALL AGES: Under one year.	One to five.	Five to twenty.	Twenty to sixty.	Over sixty.	Total, including undefined.	Population, census of 1885.	Death-rate per 1,000.	PRINCIPAL CAUSES OF DEATH: Remittent fever, etc.	Typhoid fever.	Small-pox.	Scarlet fever.	Measles.	Whooping-cough.	Croup and diphtheria.	Erysipelas.	Diarrheal diseases.	Consumption—male.	Consumption—female.	Acute lung diseases.	Brain and nervous diseases of children.	Diseases of heart and circulation.	Urinary diseases.	Adult brain and spinal diseases.	Digestive and intestinal disease.	Cancer.	Acute rheumatism.	Puerperal.	Accident.
Allamuchy	.....	.....	1	3	.....	4	787	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1	2	.....	.....	.....	.....
Belvidere	3	1	1	9	10	24	1,814	.....	1	1	.....	.....	.....	.....	.....	.....	3	1	3	3	.....	1	2	4	1	.....	.....	.....	1
Blairstown	5	1	2	2	5	15	1,590	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	1	5	1	.....	.....	1	3	.....	.....	.....	.....
Franklin	3	.....	1	8	9	21	1,382	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	2	3	2	4	1	1	.....	1	.....	1	2
Frelinghuysen	1	1	.....	8	10	20	964	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2	2	.....	4	1	.....	4	1	.....	2	.....
Greenwich	7	8	.....	1	7	18	920	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	.....	2	1	1	.....	.....	2	1	3	.....	.....	.....
Hackettstown	11	2	3	16	7	40	2,645	.....	.....	2	.....	.....	.....	.....	2	.....	2	1	.....	7	1	3	1	5	4	1	.....	2	2
Hardwick	1	.....	2	1	1	5	520	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	1	1	1	.....	.....	.....	.....	.....	.....	.....
Harmony	4	4	2	2	5	17	1,256	.....	.....	1	.....	3	.....	.....	.....	.....	1	2	.....	1	2	.....	1	.....	1	.....	.....	1	.....
Hope	2	6	2	9	9	28	1,548	.....	1	.....	.....	.....	.....	.....	.....	.....	3	1	2	2	3	.....	2	2	5	2	.....	.....	3
Independence	2	.....	.....	5	5	12	1,134	.....	.....	2	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....	3	1	.....	.....	1	.....	1	.....
Knowlton	5	3	2	9	8	27	1,4 6	.....	.....	3	.....	1	.....	.....	.....	.....	2	2	1	5	1	1	1	3	4	.....	.....	.....	1
Lopatcong	5	7	3	4	2	21	1,725	.....	.....	1	.....	1	.....	.....	.....	.....	7	1	3	1	2	.....	.....	.....	.....	.....	.....	.....	3
Mansfield	1	1	1	11	8	22	1,600	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2	1	5	.....	2	1	4	4	.....	.....	.....	.....
Oxford	15	5	4	17	18	59	4,382	.....	1	2	.....	.....	.....	1	1	.....	6	2	4	4	4	6	1	3	6	1	.....	.....	.....
Pahaquarry	.....	.....	.....	1	.....	1	351	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Phillipsburg	37	20	15	44	32	148	8,058	18.37	2	8	.....	5	.....	1	7	1	14	4	11	22	11	13	8	12	4	3	.....	3	3
Pohatcong	3	3	.....	5	5	16	1,567	.....	.....	.....	.....	.....	.....	.....	1	1	1	.....	1	1	2	.....	.....	4	1	.....	.....	.....	2
Washington	11	5	3	12	9	42	4,038	.....	.....	.....	.....	2	.....	1	1	1	1	3	1	8	2	3	1	4	1	1	.....	.....	2
Totals	116	62	42	167	150	540	37,737	14.31	5	15	.....	12	.....	3	14	4	52	21	35	72	33	41	21	46	42	14	.....	10	19

COMMENTS ON THE VITAL TABLES AND ON SPECIAL DISEASES.

The record for the statistical year ending June 30th, 1885, as shown by the tables of this report, gives an aggregrate of 8,989 marriages, 24,077 births and 23,807 deaths.

The comparative record for four years past may be thus tabulated:

	M.	B.	D.
1884–5	8,989	24,077	23,807
1883–4	8,968	25,263	21,716
1882–3	9,166	24,430	23,310
1881–2	8,337	23,108	25,959

Slight variations occur from the supplemental returns, but not so as to materially affect the comparative statement. It is believed that the marriage and death-rates are quite correct, but that there is not as full a registry of birth returns as there should be. This failure occurs chiefly in the cities, some of which are now taking measures more fully to enforce the law. Legal decisions have so often recognized the right of the State to secure this information, and physicians, as a rule, have so far recognized it, that any lack of complete return is to be attributed to carelessness. The books now furnished for the convenience of practitioners are found very serviceable and cause them to be less apt to forget the filling out of a blank on the second or third visit. As the cases are now so frequent in which there is need to get a statement of time of birth, both in law and for statistical purposes, it is important that those concerned be able thus to verify age and other circumstances.

The record as to marriages is more and more complete. Clergymen of all denominations have come to recognize the importance of this record. The form of statement given on the back of the marriage blank enables them to have the signatures of the parties in those cases where the persons are unknown or the age needs to be certified.

The examination of our records and of the divorce records shows that we have little need of a law as stringent as that which has been passed in Pennsylvania. If that law continues in force many from that State will hereafter need to seek in New Jersey the proof of their marriage contract.

The records of death for this year show an increase over the last year, 1883–4, of 2,649. It was a year of exceptional health—so that the present year has only been the average of the last four years. As we come to study the various tables of localities several causes are apparent. There was, for the State at large, a decrease in remittent fever of twenty-one deaths, a diminution of five deaths from small-pox, and an increase of two deaths from typhoid fever. Scarlet fever had an increase of ninety-nine deaths, measles a decrease of fifty-four deaths, whooping-cough an increase of sixty-five and diphtheria the sad increase of 469. Erysipelas was six less than the former year. Diarrheal diseases, as found before the age of twenty, destroyed 383 lives more than in the former year. Consumption destroyed 116 more males and eleven less females. Acute lung diseases caused a death increase of 392; brain and nervous diseases of children, 193; diseases of heart and circulation, 179; urinary and kidney diseases, forty-seven, and digestive and adult brain and spinal diseases an increase of 231; intestinal diseases of adults, sixty-five; cancer, fourteen; puerperal diseases, forty-seven. The most marked increase to be found is in diphtheria and diarrheal diseases. When the specially low death-rate of the former year is taken into consideration, as well as the increase of the population, the increase will be found to fall almost entirely with diphtheria, acute lung and diarrheal diseases. In any climatological comparisons, whooping-cough needs to be added to acute lung diseases, since an increase in number of deaths therefrom is generally owing to pulmonary complications. As we compare further between cities over 5,000 and the county, we find a diminution of typhoid fever and scarlet fever and measles and whooping-cough. But the city increase of diphtheria was 336 out of the total increase of 469. (The population of these cities is 689,977 out of the total State population of 1,278,033.)

Diarrheal diseases had an increase of 108 in cities, or scarcely their natural proportion. Puerperal diseases had an increase of forty-five in cities out of the entire increase of forty-seven. Acute lung diseases had an increase in cities of 202. Of the brain and nervous diseases the city increase was 130. The city increase in diseases of heart and

circulation was ninety-four. There were twenty-four less deaths in cities from urinary and kidney diseases, notwithstanding a slight general increase. Brain and nervous diseases increased in cities 115 out of a total increase of 130.

A still further analysis of individual cities will show other significant facts, especially when compared with changes being made.

The relations between cleanliness, good water and good drainage and good sanitary administration and the diminution or control of various diseases is indisputable. While exceptional cases occur in which we are not able to trace the connection, and while a disease bred or made malignant by filth may acquire such specificity and such virulence as to invade healthy homes, just as the fires which originate in combustibles now and then destroy a "fire-proof" building, these exceptions do not invalidate the abundant evidence of the relations between filth and disease or disprove the fact that a great majority of diseases are practically preventable or reducible to a meagre minimum.

REMITTENT FEVER.

The encouraging diminution in remittent fever from the average of the past six years, we believe comes in some small degree from a greater appreciation of the need of drainage and from the avoidance of exposure to malarial influences where they exist. Where thorough drainage is instituted, one of the first records of its effect is the diminution of periodic fevers, except where the large amount of drier ground filled with decaying vegetable debris is not utilized for growing crops. Our drainage laws are now quite available, and in parts of the State much attention is given to the subject. Two hundred and nine deaths from remittent fever means a considerable amount of chills and fever and other malarial disorders which are not fatal but suspend labor and cause great injury to health. It is to be remembered that all these and all that die therefrom have inbreathed an air different from that which is needed for respiration, and had they lived in places where drainage is perfect and where natural processes of vegetable decay and the proper appropriation of the results by growing vegetation are carried on uninterruptedly, neither the sickness nor the deaths from this cause would have resulted. It is worthy of note that over one-half of the cases occurred in cities of over 5,000 inhabitants. Imperfect drainage of the soil of our cities is one of the chief evils to health.

TYPHOID FEVER.

The average of deaths in New Jersey for the six years previous to this, from typhoid fever, was 576. An increase to 646, although in part accounted for by increase of population, is not a very satisfactory record; 396 of the cases in cities is beyond the average of 332 for the last six years. This is the more significant, because all careful physicians now more thoughtfully guard the discharges, and since the disease does not now so often destroy several members of a family. Health officers are more vigilant in watching over localities where it exists, and institute such measures of disinfection and cleanliness as tend to prevent its spread. There is still much to be done in all these directions. In the meantime, the medical profession needs to be diligent in settling the question whether typhoid fever occurs from a combination of evils and under special circumstances without any antecedent case, also to determine whether there are mongrel or cesspool fevers of a low type which destroy life, which are not remittent fevers and yet have not the characteristic lesions of typhoid. It would be a great gain to medical knowledge, as well as to the public health, if every skilled and experienced practitioner would place on record his opinion on this subject, together with the accurate statement of the cases and of the facts by which he had arrived at his conclusions.

SMALL-POX.

Our exemption from small-pox has been almost complete this year, two deaths only having occurred. If the chief incentive to vaccination, as some aver, is an epidemic of small-pox in some part of the State, then this is a perilous fact. But it is believed there is a growing habit of securing vaccination for children, and that careless and culpable neglect is not so common as formerly. Both the law and the influence of physicians, school boards and Boards of Health has made itself felt. The choice now given between arm-to-arm and bovine vaccination satisfies the anxieties of the few who formerly objected.

From the City Board of Health, 301 Mott street, New York; H. A. Martin & Son, Roxbury Station, Boston, Mass.; Dr. E. L. Giffith, State street, Chicago, and the firm of W. Wyeth & Sons, Philadelphia, can now be had lymph, such as is fully indorsed by

competent examiners. It can almost be said that there is no good and sufficient reason why a case of small-pox should ever occur again in the State of New Jersey. While most genuine and thorough vaccinations last a lifetime, it is a wise precaution to repeat vaccination between fifteen and twenty years of age, or to resort to it again if small-pox is prevalent in the vicinity.

SCARLET FEVER,

With its 646 fatal cases, testifies to the need of thorough isolation, disinfection and of very early attendance on the first symptoms of the disease. Seven hundred and thirty-four was the average of cases for the last six years previous. If there is proper watchfulness and early attention, it is far more manageable than formerly and ought not to be allowed to become epidemic. Out of the 646 deaths this year, 480 were in cities of over 5,000 inhabitants. Out of the 4,404 deaths of the previous six years, 3,007 were in cities, showing how much more prevalent or fatal a disease it is in the cities than in the country.

MEASLES

Is fortunately a disease that does not cause so large a death-rate in proportion to the number of cases. Indeed, from what we know of the disease and of its severity as modified by exposure to cold, by climate, etc., it is very certain that thorough care ought to make it nearly always a very mild disease. The deaths therefrom this year were 135. The average for the six years previous was 127, but this average was much raised by the former year, in which the deaths were 189. The disease has been very prevalent in the State for the two years ending with last July. Of the deaths this year, 87 occurred in the cities. In the former six years, out of 762 deaths, 566 occurred in the cities, this larger proportion being chiefly owing to 189 deaths in Jersey City and 149 in Newark. For the five former years, out of 573 deaths therefrom, 414 occurred in cities. Here, again, we see how cities excel in epidemics.

WHOOPING-COUGH.

Out of the 181 deaths from this cause the last year, 102 occurred in cities. Out of the 116 deaths of the previous year, 72 occurred in

cities. For the six previous years, the average of deaths from this cause was 179. The average in cities was 111. It is not always recognized that whooping-cough is a more fatal disease than measles. Nor is it often enough remembered that in whooping-cough the discharges from the throat and the nostrils should be received in disinfectants, and not be allowed to dry so as to mingle with the atmosphere of rooms.

CROUP AND DIPHTHERIA.

The sad record of membranous croup and diphtheria, which have now come to be regarded as so closely allied in their pathological and clinical characteristics, ought certainly to attract the most earnest attention of all who look upon the death of children as a loss to families and to the State. It is the more serious because, unlike most of the communicable diseases, it is apt to recur, and because of the insidious character of the contagion. Of the 1,496 deaths this year, 1,061 were in cities. The average of deaths therefrom for the six previous years, was 1,124, of which an average of 762 were in cities. While this shows the disease not to be equally prevalent in the country, the proportion of cases in country districts and small villages and towns is greater than in the case of the other communicable diseases. Its record in the last seven years, of 8,242 deaths, as against 5,050 deaths from scarlet fever, serves to show how much more formidable it has become than the former great enemy of child life. The Board hopes, during the present year, to set on foot measures for a closer local study of this disease and for more earnest efforts on the part of physicians and local Boards.

DIARRHEAL DISEASES.

Two thousand eight hundred and forty-five deaths from diarrheal diseases of persons under twenty years of age, against an average for the last six previous years of 2,371, and an increase of about 400 over the previous year, is one of those indications of increased diarrheal tendency which too often has proved the precursor to some epidemic affecting especially the intestinal tract. Our office tables and our reports show that dysentery was a little more prevalent than usual, but nowhere reaching an epidemic, except in a section of Middlesex county. The subject of infant feeding has received much attention recently, and it is believed that there is much greater need

of accurate attention thereto. The various artificial foods differ much, some of them being very good but more of them intolerably bad.

Impure water makes a large record in diarrheal disease. So does the use of imperfect foods, such as stale vegetables and diseased meat. Note the fact that out of an average of 2,371 deaths from this cause of persons under twenty, 1,548 occurred in cities. With the fact that so many leave the cities for the summer months, and that no children are included under one month, this is a large relative mortality. Attention is directed to what is said elsewhere in this report on infant mortality and artificial foods.

CONSUMPTION.

The 3,320 deaths this year from consumption is a little above the average of 3,050 for the last six years previous.

Two thousand and eighty of these occurred in cities, the average of cities for the six years previous being 1,844. This means that 13.94 per cent. of all deaths are caused by this disease.

The causes of consumption are rapidly increasing in cities by reason of close dwellings, close factories, close school-houses, the dust of trades and occupations, and various influences which depress life. More than any other disease among those over eighteen years of age, it is the record of unfavorable conditions for health and life.

The analysis of cases and the consideration of consumption as a preventable disease were fully presented in the fifth report, 1881. There is a great need that the attention of all sanitarians be fully directed to this disease, which destroys far more than the wandering epidemics, and which is even more preventable than the most of them.

Tuberculosis, as found in animals, is now often discussed in its relation to human tuberculosis. In all the English markets and dairies both the meat and milk of such animals are condemned as food. Many claim that the disease is communicable. It can also be said that pleuro-pneumonia and other diseases of animals are well worthy of comparative study by physicians. As by law the report of the Board of Health on animal disease is made to the Board of Agriculture, its reports may be consulted for further information.

ACUTE LUNG DISEASES.

The record of 2,566 deaths from these is an increase of 392 over the previous year. The average for the six years previous was 2,339, which, allowing for the increase of population, is nearly the present average. Of the 2,566 deaths this year, 1,618 occurred in the cities. For the previous six years the city average was 1,424. As with consumption, the great increase of acute lung affections is in the cities. This again points to the need of purity of air, and of great attention to all conditions of crowded living. Pneumonia has so much increased in frequency and severity as sometimes to seem to prevail as does an epidemic. It is not so much due to our changeable climate as to close dwellings, improper modes of heating and various exposures, such as those who know how to care for their health, know how to avoid.

BRAIN AND NERVOUS DISEASES OF CHILDREN.

One thousand seven hundred and ninety-one deaths from these is an increase over the 1,598 of the former year. The average for the previous six years was 1,701. No class of diseases points more accurately to the loss of hereditary vigor. The death of many such a child is the record of over-work, over-anxiety, or some other form of undue pressure on the part of the parents. Of the 1,791 deaths, 1,240 occurred in cities. The average in cities for the previous six years was 1,169. A sustained average of over two-thirds in cities tells something of the pressure of city life, as, also, of the undue nervous susceptibility of those that survive.

DISEASES OF THE HEART AND OF THE CIRCULATION.

These numbered 1,503, of which 840 were in cities. The number for the previous year was 1,324, and the average for the six years previous, 1,150. The average for cities during the six previous years was 609. This is a lower average than is generally supposed. Two facts may partly account for it. Acute rheumatism is a common disease of the country and among those exposed to farm labor, and often is the foundation of heart disease. It is also true that, after middle life, many who find some form of heart impairment move out of cities into the country, and so become enrolled as belonging to country localities.

URINARY DISEASES.

These numbered 939 deaths, of which 534 were in cities. The average for six years previous was 682, of which an average of 396 was in cities. Most of these are some form of kidney affection, especially those forms known as Bright's disease. Each year shows a steady increase.

ADULT BRAIN AND SPINAL DISEASES.

One thousand eight hundred and ninety-five deaths from adult brain and spinal diseases, as added to the deaths of brain and nervous diseases among children, show how large a prrt of the population die from these causes. Of these 921 were in cities. The average number for the six previous years was 1,485, that of cities being 709.

DIGESTIVE AND INTESTINAL DISEASES.

Adult deaths from these numbered 1,140, of which 623 were in cities. The average for the six previous years was 977; the average for cities being 511.

CANCER.

Of the 498 deaths from this cause, 289 were in cities. The average for the six years previous was 433, with an average of 236 in cities.

ACUTE RHEUMATISM.

Acute rheumatism shows a record of thirty-six deaths for the year, of which seventeen were in cities. The average for the last six years is sixty-three, the average for cities being thirty. It is claimed by many physicians that since the introduction of the treatment by salycylic acid, or of this in conjunction with alkalies, the death-rate has decreased, and that resultant heart trouble is less frequent.

PUERPERAL DISEASES.

These show an increase over the previous year. The relations of erysipelas thereto, as well as the influence of scarlet fever contagion and of any septic conditions, are to be borne in mind.

The deaths this year were 268, of which 176 were in cities. The deaths of the previous year were 221, of which 131 were in cities. The increase in cities this year was chiefly in Jersey City and Newark. The average for the six previous years was 234, of which an average of 134 occurred in cities.

ACCIDENTS.

Eight hundred and fifty-seven deaths by accident, of which 511 were in cities, shows a gradual increase from the various casualties of railroads, machinery, bathing, etc. There is much need of greater care as to all machinery. No losses seem more avoidable than most of those which occur by what we call accident. All machinery should be properly protected by methods now well understood.

The time has come when these records can be studied with great advantage by all physicians and all who are interested in the public health. We now have for seven years the facts in evidence as to the actual ravages of disease, and are able to associate their prevalence with localities or with causes within the range and duty of human control. Life is not only precious to the individual citizen, to the family, but to the State. Society has no greater waste and no greater burden than untimely death and unnecessary sickness. The laws of health are as definite and as ascertainable as most other laws. They have their basis in the natural arrangement of things, in definable infringements upon laws or a want of adjustment to changed circumstances. The causes of disease are no more recondite than those which obtain as to other physical laws. The rewards of discovery in this science are soon manifest in an art which means the prolongation of life and the happiness of increased healthfulness. There is enough already known to stir into energy those who are accurate in the application of results. There is enough unknown to inspire those who love to investigate in lines full of promise. We therefore urge upon physicians and Health Boards the most earnest attention to all the details of sanitary care and a fuller study of the conditions necessary to health. As the friends of the State, we cannot do so much in any other direction for the preservation of its vigorous progress; as lovers of our race we can in no other way better show our interest in the welfare of mankind, and as physicians and sanitarians we can thus certify our zeal in advancing the occupation to which we are devoting our energies.

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